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1912

A Uniform Course of Study in Agriculture

For the ELEMENTARY SCHOOLS OF OHIO

PREPARED BY THE DIRECTION OF THE
State Commissioner of Common Schools

A UNIFORM COURSE OF STUDY IN AGRICULTURE

FOR THE

ELEMENTARY SCHOOLS OF OHIO

PREPARED BY THE DIRECTION OF THE

Ohio. STATE COMMISSIONER OF COMMON SCHOOLS

COLUMBUS, O.:
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To the Boards of Education, Superintendents and Teachers:

Agriculture is not a wholly new subject, nor is it one foreign to our public school system. The last General Assembly made it a mandatory part of our courses of study for the Elementary and High Schools. The wisdom of this is patent to us all.

This course of study arranged by the four Supervisors of Agricultural Education and myself is intended to suggest ways and means of giving to our boys and girls of all the schools the most helpful plans of acquiring a comprehensive knowledge of those parts of the subject that are appropriate and the study of which will be profitable; it is further intended to teach the happiness, health, and wealth of country life and to make the boys and girls proud of rural life whether they live in the country or not.

In laying out the work for the year, it should not be presumed that all found in this course is to be studied or taught; the material herein is suggestive throughout; select from it what is wholesome and in harmony with the agricultural and home life of your several communities; select only sufficient topics and amount of work as can be well done during the year; it might be well to outline the work month by month so that too much may not be attempted; four or five subjects properly planned for the year's work and well taught may be sufficient for the average school, for agriculture and home craft are to have only their appropriate share of the time and efforts of the teachers and pupils,—the other studies must have theirs.

It will be well for the members of boards of education, superintendents and teachers to keep at hand the name and address of the Supervisor of the district in which they live for he will endeavor to answer by mail the questions sent to him and will also be glad to come to any part of his district when called upon to render any aid possible.

Finally, the teaching of this subject will have reached the stage most helpful to the boys and girls when home and school work together heartily and sympathetically; the teaching must fail in its highest and best sphere if it does not touch and retouch the farm, the farm home and all farm life; let it be our constant aim to make a happier and a better citizenship while we are making better farmers, and better home makers; this being our ideal, the teaching of this subject will find its best results and consummation in the homes and on the farm.

Yours very truly,

FRANK W. MILLER.

OUTLINE OF A COURSE IN AGRICULTURE FOR THE ELEMENTARY SCHOOLS.

INTRODUCTION.

In the primary grade the chief object should be to lead the child to observe carefully and develop the habit of investigation. Throughout the entire course the teacher should be ever mindful of the fact that the subject of agriculture, if properly taught, is of high educative value. It imparts to the child the ability to reason, the power of independent thinking and creative expression, richness of imagination, appreciation of that which is beautiful, and the culture which are generally developed through the instrumentality of the classics, mathematics, science, and art.

It is not the intention of this course to make farmers of all farmers' sons, but to make better farmers of those who wish to remain in that occupation, and to make better citizens of all. The subject is full of human interest and we can never wholly separate our interests from the soil on which we walk, and the plants and animals upon which our lives depend.

This course is divided into four divisions, to be known as the Primary Division, composed of all pupils below the second grade. The First Division, composed of the second, third, and fourth grades. The Second Division, composed of the fifth and sixth grades. The Third Division, composed of the seventh and eighth grades of the Elementary School.

Primary Division.

Note to Teacher: The work outlined in this division can be taught in connection with language and alternated with Oral Geography and Oral Physiology. Can also be given in connection with general exercises in the mornings or Friday afternoons.

There should be at least two ten (10) minute periods a week. The teacher shall select such parts of the following work as may be suitable for his grade, grades or school. Use supplementary work.

Trees. — Gather leaves. Note differences in size and shape. Recognize a few trees by their leaves. Some trees drop their leaves in Autumn. Some do not. Evergreens.

The different parts of plants, stems, roots, leaves, flowers, fruit, etc. Collect seeds to show how they are protected and distributed. Gather seeds of thistle, milkweed, and dandelion and let them sail in the wind. Effect of frost on tender plants like tomatoes, etc..

Make a collection of caterpillars and place in box with leaves. Observe spinning of cocoon. Emergence of moth or butterfly in Spring.

Change in appearance of landscape as winter approaches.

ANIMALS.—Animals of the farm; their uses. Wild animals found in the community, rabbits, squirrels, etc. Tell stories about them.

BIRDS. — Migration; return in Spring; permanent residents. Nest building. Learn to recognize four or five birds.

Grow cuttings of pussy willow and lilac in water. Germinate beans in sawdust. Learn the common names of a few flowers and trees. Fruit and seed come from the flower.

Note change in landscape as Spring comes..

Teach the children to be kind to animals. Teach them not to be afraid of insects and spiders. The house fly a carrier of disease. Breeds in filth. Dangers of fire.

First Division.

(Grades 2, 3, and 4.)

The work outlined in this division can be taught in connection with Language, and alternated with Oral Geography and Oral Physiology. Can also be given in connection with general exercises in the morning and on Friday afternoons.

The subject of Agriculture is now one of the regular studies of our schools and as such must be placed in the regular school curriculum for its full share of time and execution.

In this Division pupils can be taught to observe and study domestic animals, plants, trees, and bird life more extensively than in preceding division. Make seed collection and study methods of planting seeds. Observe nature's plan of seed distribution by securing samples of each method. Learn to recognize seeds of familiar farm plants. Make a study of familiar fruits and grains.

Shelter for farm animals. Natural covering of the different animals. How animals spend the winter; hibernation. Study migration of birds on basis of sojourn here — permanent residents, summer residents, winter residents, migrants, service rendered by insectivorous migrants. Take excursions when convenient to the woods and creeks, observing plant and animal life.

Care of young chickens and young farm animals. Learn to distinguish some common flowers and to know the uses of animal, vegetable, and farm products.

Experiment in growing cuttings in water, sand, or loam. Make a collection of leaves and name them. Study buds, how protected, how arranged. Teach common names of trees in your locality.

Use blackboard calendar for weather record. Study cause of rain, frost, hail, snow, and ice. (See some good text in Oral Geography).

Study use of thermometer and make records of out-of-door temperature. Use shadow stick to show altitude of sun at noon, during different months of the year. Time and place of rising sun; of setting sun. Phases of moon. Great Dipper. North Star.

Objects and specimens in this work can be used very profitably in the lessons in Drawing, in this and all following grades.

Simple experiments with seeds, germinated between blotters or cloth, and in sawdust. Study conditions of growth by varying moisture, light, temperature, etc. Peas, corn, or pumpkin seed suggested for use.

Preparation of the soil; the growth and cultivation of plants. Care and use of garden tools. Plant the seed of flowers and vegetables at home or at school. Keep a record of the work done in cultivating same. Exhibit.

The Primary and First Divisions may be combined when convenient and feasible. Time required to cover this work — three years.

Second Division.

(Grades 5 and 6.)

Teach the work outlined in the Second Division in connection with Language and Geography and alternate with lesson in Physiology, History, Arithmetic, and Reading. Work can also be done in connection with general exercises in the morning and on Friday afternoons.

Use Supplementary work.

The work in this Division should be a continuation of that suggested under "First Division." It is expected, however, that pupils are to learn more detail and become more familiar with the modes of living and the uses of plants and animals to man when they reach these grades.

The practical work at home by the pupils must be carried out as carefully as the theory study at school if we are to have a full measure of success with Agriculture in the schools. Teachers may supervise this work at home.

Review study of familiar flowers and home farm products.

Study migration of birds on basis of sojourn here — permanent residents, summer residents, winter residents, migrants; service rendered by insectivorous migrants.

Classify *plants* as useful, injurious, annuals, biennials and perennials; *trees* as deciduous evergreens, fruit trees, trees for ornament, fire-wood or commercial purposes. Study *roots* under useful, injurious, different forms and purposes. *Stems*—Aerial and underground, useful and injurious. Distinguish underground stems, bulbs, tubers, etc., from roots. Give example of each. *Leaves* — Margins, veins. *Flowers* — perfect and imperfect. Make a collection of flowers by pressing and mounting specimens.

Animals.—Fur-bearing, food-producing and domestic.

Minerals. — Make a collection of common minerals. Give a short description of each, as to uses to man, where and how mined. Make a collection of common rocks or fossils found in your neighborhood. Teach uses of limestone, sandstone, shale, coal, slate, marble and granite; how formed; where produced? Perform some simple experiments. Grow radish and lettuce for early market or home consumption—use home seed if possible. Study catalogue to gain knowledge of varieties of vegetables, etc. Experiment by planting different varieties to find those best suited to your locality.. Keep record of work done in cultivating your plots or gardens.

The Lawns. — Preparation; selection and sowing of seed; rolling; watering, fertilizing; mowing; lawn weeds and how to combat them. Special study of most common weeds found, common garden plants, and common garden insects — useful and injurious.

Study of Simple Tools and Machines. — Various levers; uses and advantages of Jackscrews, pulleys, wheel and axle, derrick, etc. Names and uses of various pieces of farm machinery; cost of each; care of tools and machinery. Plan to build a hot bed. Discuss uses of same. Distribute plants among pupils from a successful hot bed. Have a contest among pupils receiving plants to grow or from plants grown at their home. Conduct potato or other vegetable contests followed by exhibit of products — keep record of work done in cultivating. Find yield and value of products produced.

Learn to identify useful birds, injurious birds. Obtain colored pictures or birds to study, if necessary.

Origin of Soils. — Identification of sand, gravel, loam, clay, silt; experiment with soils. Study local soils. Value of farm lands and village lots. Drainage; ditches; tiles. Draw diagram showing drainage plan on home farm. House and cellar drains; distinguish between drainage and sewer tiles.

Household Pests. — Damage done; how destroy them — mouse, rat, fly, mosquito, cockroach, bed bug, clothes moth, etc.

Water Supply. — How secured. Types of wells and pumps; windmills. Methods of getting water to stock and for house use. Impure water. Garden irrigation.

Lighting Systems. — History of lighting. Methods used in your locality. Protection against fire.

Transplanting Tree Practice. — Study common trees, value for posts and ties, etc. Secure and plant useful trees at home and at school. Orchard methods. Learn to grow the common fruit tree found in your locality. Insests injurious to fruit and life history. Learn how to combat them. Distinguish between sucking and chewing forms, insecticides for each.

Good Roads. — Transportation, marketing.

Preparation and Marketing of Products. — Produce, how transported. How to deliver and ship by railroad. How to find a buyer. The merchants side of the work.

Formation of Agricultural Clubs. — What can be done for the social life of the rural people, literary and musical programs, research work, exhibits, lectures, collections of specimens in the vicinity, advice and suggestions from parents, and others, contests, preparation of Fair exhibits, etc., are all legitimate lines of work for the clubs. Let the membership be composed of any one really interested in addition to the pupils of the school. — None are too old or too young if they are interested. Let the fields, the gardens, the dairies, the lawns, the school gardens, the school farm-lots, the roads, the lanes, the river banks, and granaries be the recitation places rather than the class bench.

A book should be selected that is intended for the seventh and eighth grades.

A review should be made of the work suggested in the "Second Division" in connection with the text-book work. Lessons from the text in Agriculture can be alternated with those of Reading, Arithmetic, Physiology, etc., in these grades. Work in this division can also be assigned in connection with Grammar and Composition, and Geography also at the opening exercises in the morning and on Friday afternoons. The teacher shall select such parts of the following to be used with the text in Agriculture, as may be suitable for his grade, grades or school. Use supplementary work.

Time required for the work of this division, two years.

Fall Work.

Report of vacation activities including work done and money earned. Special study on the most important farm crop in your locality. Use and outline for this special study similar to ones suggested below on Corn, Wheat and Fruit.

Study of Corn. — Its culture and improvement. Selecting good seed. Experiments to show shrinkage by keeping over winter. Ensilage. Varieties grown in your neighborhood, history of one or two varieties. Characteristics of a good ear; simple introduction to use of score card. Factors involved in marketing corn. Celebration of Corn Day — Corn Display and Contest. (Secure free government and free state bulletins on corn.)

Study of Wheat or Other Grain. — Pupils take samples to school; examine for weed seeds and other impurities. Test one hundred grains of each sample for vitality. Method of planting, machines used in planting. Observe growing plants. What parts of the plants live over winter. History of wheat or other grain. (Secure free government and free state bulletins on culture of the grain most common in your locality.

Study of Fruit. — Study of Apple or the chief fruit crop in your locality. Characteristics of trees. Causes and remedies for imperfect fruit. Spraying. Factors involved in gathering, storing and marketing fruit. Have an exhibit of varieties grown in the district. Conduct contest. (Secure free government and free state bulletins on the culture of the fruit most cultivated in your locality.)

Weeds. — Make a collection of seeds; label. Study weeds common in grain fields, pasture, meadow and garden. How destroy each kind. See Ohio Weed Manual.

Fungi. — Compare with seed plants. Mushroom. Experiments in growing and destroying molds and bacteria; sterilization; treatment with formalin; smut, rusts, blights, rots and scabs. How combat these? Fungi that attack insects. Find examples.

Collection of Insects.—Classify as to beneficial and injurious. Crop attacked by each. (Secure free government and free state bulletins on injurious and beneficial insects to growing crops.)

Forage Crops. — Grasses — best adapted for meadow, for pasture, variety in your locality. Use of leguminous plants. Other forage crops as rape, millet, sorghum, etc. (Secure free government and free state bulletins on Forage Crops.)

Dairying. — Compare Dairy and Beef breeds. Examples of each class; report of kind owned in neighborhood. Secure a Babcock Tester with milk and cream outfit. Test samples of milk and cream from different breeds. Calculate amount of butterfat produced in a certain period and value of same. Discuss cost of producing butterfat under various conditions. Methods of feeding, what to feed and care of cows. Plans of building sanitary barns and farm soils. Use of separators. Purefood; pure milk; pure drinking water. (Secure free government and free state bulletins on Dairying.)

These recitations must work the hands and the head, and the more the head and hands work together the better.

Organize an Agricultural Club; it brings the men and women, the boys and girls of the district together in a new social pride; the federation of these clubs in the township breaks down the old selfish district lines and the boys and girls live in a wider horizon, and its exhibits carried to the County and State Fairs and the boy and girl become parts of these fairs; into it invite all the young people of the vicinity; make the older people honorary members; give an entertainment or two and start a library with much agricultural literature in it; hang some picture in your school house; discuss and study carefully at least one agricultural subject at each meeting; let the program be entertaining and instructive. The State Traveling Library will help along these lines.

Climatology of Ohio by the Ohio Agricultural Experiment Station, Wooster, O. (Bulletin No. 235.)

Winter Work.

Housing of farm animals. Special study of horse, hog or sheep. Different breeds of horses, hogs or sheep in neighborhood. Care of these animals in winter.

Farm Machinery. — Kinds, uses, value, care of. Gasoline engines, power machines, etc. History of kinds to show improvement.

Soils. — Study of structure of corn kernel; tests for starch and oil — composition of food stuffs. Secure some samples of corn products. Plant food; how plants obtain food. Test soil for acid and alkali. Elements usually lacking in soil. How these are obtained. Commercial fertilizers. Study kinds of soil. Make collection of soils. (Secure free bulletins on Soil Fertility.)

The Crop Reporter. A publication furnished by the U. S. Dept. of Agriculture can be obtained by addressing the Chief of the Bureau of Statistics, U. S. Dept. of Agriculture.

Spring Work.

Poultry Raising. — Breeds of chickens of the neighborhood; characteristics of each; feeding, housing, general care. Incubators and brooders; expenses and profits in poultry. (Secure free bulletins on Poultry Culture from state and national departments.)

Where fruit raising is practiced extensively, study propagation by grafting. Why necessary. History of some one fruit from seed to maturity. Pruning, planting and spraying of fruit trees. (Secure Spray calendar from Wooster Experiment Station, Wooster, Ohio.)

Corn Study. — Germination of seed, make corn testers; compare tests for vitality. Grading corn. History of corn. Varieties adapted to your locality. Planting methods. Experiments with depth of planting. Draw diagrams and make preparations for planting your flower or vegetable garden. Treat potatoes for scab with formalin. Examine clover and grass seed with hand lens to find weed seed and other impurities. (Secure free bulletins on Flower and Vegetable Gardening.)

Bird Study. — Make a list of native birds beneficial to farm crops. Injurious to farm crops. (Secure free bulletin on Beneficial Birds to the Farmer.)

Study clover plant, habits of growth, length of root, tubercles on roots. Identify other legumes. Examine roots for tubercles. Experiment where favorable to do so, by planting some alfalfa with and without inoculation.

Investigate methods of retaining fertility of the soil of Ohio; rotation of crops; mixing of home fertilizers; retaining moisture in the soil and value of soil mulch.

Arrange plans for vacation studies and experiments with corn, potato and other vegetables. Girls give special attention to flower and

vegetable gardens; keep simple records of all work done and conduct a corn, flower and vegetable exhibit and contest.

Tobacco Raising. — Seed, plants, care of, stripping, sorting, packing, marketing.

Orchards, forestry, hot beds, cold frames.

School exhibits, reports of work done. Fair exhibits.

Plant the different weed seeds in boxes of soils and have the children learn to know these weeds by their very early forms of growth.

On a table, a shelf, or a window sill with shelf extension, have at all times some manual work of collections of specimens, drawings, seed growing and testing, sowing, samples of farm products grown in the district, flowers, etc. Let these exhibits be changed frequently; have contesting exhibits by the pupils; have class exhibits of all the grades, for the very smallest pupil is not to be ignored in showing his work.

Collecting and mounting of specimens of the insects, seeds, flowers, fruits, grains, animal and mineral products, etc., of the township or county will be useful and pleasant work for the pupils during the sumer months and with a little help from the taecher, they will do very effective work in all the grades. Have at least one beauty spot in your school district as the result of your work in agriculture in the school,— farmhave it either on the school lot or at some home of your pupils.

SUGGESTED TOPICS IN AGRICULTURE AND THE HOUSEHOLD ARTS FOR THE GIRLS.

The Garden:

The vegetable garden, the flower garden, the small fruit garden, hot beds, cold frames, and the marketing of the products, insects and other enemies of the garden plants, sprays. Garden irrigation.

Poultry:

Chickens, ducks, turkeys, geese, etc., and the marketing of the products. The health of the barn and poultry yard families. Lice, diseases and other enemies of poultry, etc.

The Lawn:

Laying out the lawn, the flowers on it, the shrubs, trees, care of it, the enemies of the flowers, shrubs, trees, etc.

The Dairy:

Types of cattle, the milk, butter, cheese, the creamery, the milk tester, separators, etc., care of the utensils, the dairy barn, feeding, marketing the products.

The Apiary:

Bees, bee hives, swarming, diseases of the bee, honey, bee foods, etc.

Orchards and Small Fruits, Grapes.

Birds.
Melons, pumpkins, squashes, etc.
Weather Bureau. Meteorology.
Agricultural clubs, Home and School sociology, Community life.
Foods, Food Elements, Drinking Water Suppply.

Domestic Science:

Home making and house keeping, cooking, bread making, and all baking, sewing, home decorating, butter making, the health of the home and the farm premises, buying for the farm and farm home, selling the farm products, drawing and the other arts, home economics, home sociology, nursing the sick, household accounts, care of the house and prevention of sickness, laundering, recipes.

Home beautifying, making home attractive, naming the farm, the lawn, a handy kitchen, the dairy, preparing the products for market.

Exhibits and reports of pupils.
The Fairs—State and local.

General Suggestions:

Use the local papers for spreading the news and the good things done should be passed on to our neighbors.

Send to the Department at Washington, D. C., for their bulletins; do this department, no better are sent out from any board of its kind in the Agricultural College at Columbus; last but not least write to the Secretary of the State Board of Agriculture at Columbus for the bulletins of this department, no better are sent out form any board of its kind in the United States. Teachers, pupils and patrons will find excellent material on any phase of the work; good directions for detailed courses of study and for work on the farm, in the garden, at the barn, in the home and in any and all departments of farm work will be found in these bulletins that may be had for the asking; neither is the scientific side of any phase of this work neglected in these bulletins; so whatever we may wish will be easily obtained by simply writing for them.

Whatever success we may have in the school work in and at the school, our task will yet be incomplete if we neglect to see it carried to the home, to the farm and to the community in general. The teacher here has a splendid opportunity to take his or her place in the community life and activities in the school district; the teaching of agriculture must link the school and homes closer and the work of one must and will correlate the other or our whole scheme will lose much of its flavor and value. When the teacher and parent find their work overlapping and growing together in the life and ambitions of the child then indeed will the home and school take their rightful places in the child economy and child rearing; then will misunderstandings and crossing of lines of discipline be reduced to a minimum. The teaching of agriculture in some of its many phases will bring happy results along these lines that must be

seen with a mildly prophetic eye. The Agriculture Clubs will be the one strong medium for this as well as for the place where the intellectual and moral development takes place along side the study of the utilitarian Here the elements of the old spelling school, the literary society and the agricultural sciences and economy will mingle and grow into good citizen ship and moral and intellectual fiber which will make farm life just as honorable and refining and respected as any other vocation—yea even more so for the environments are happily conducive to such as nowhere else.

Names and Addresses of the Supervisors of Agricultural Education

H. L. Goll, Swanton, Fulton Co., of the Northwestern District.

S. A. Harbourt, Andover, Ashtabula Co., of the Northeastern District.

J. R. Clarke, 373 Wilbur Ave., Columbus, Franklin Co., of the Southeastern District.

Lester S. Ivins, Lebanon, Warren County, of the Southwestern District.

State Supervisors of Agricultural Education.

In accordance with the provisions of the Cahill law, Commissioner Miller has appointed four Supervisors of Agricultural Education. The names and addresses of these Supervisors, together with the counties comprising each district are as follows:

NORTHWESTERN DISTRICT.

H. L. Goll, Supervisor, Swanton, Fulton County, Ohio.

Counties — Allen, Auglaize, Crawford, Defiance, Erie, Fulton, Hancock, Hardin, Henry, Logan, Lucas, Marion, Mercer, Morrow, Ottawa, Paulding, Putnam, Sandusky, Seneca, Union, Van Wert, Williams, Wood, Wyandot—24 counties.

NORTHEASTERN DISTRICT.

S. A. Harbourt, Supervisor, Andover, Ashtabula County, Ohio.

Counties—Ashland, Ashtabula, Belmont, Carroll, Columbiana, Coshocton, Cuyahoga, Geauga, Harrison, Holmes, Huron, Jefferson, Lake, Lorain, Mahoning, Medina, Portage, Richland, Stark, Summit, Trumbull, Tuscarawas, Wayne—23 counties.

SOUTHEASTERN DISTRICT.

J. R. Clarke, Supervisor, 373 Wilbur Ave., Columbus, Franklin County, Ohio.

Counties—Athens, Delaware, Fairfield, Franklin, Gallia, Guernsey, Hocking, Jackson, Knox, Lawrence, Licking, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Pickaway, Vinton, Washington—20 counties.

SOUTHWESTERN DISTRICT.

Lester S. Ivins, Supervisor, Lebanon, Warren County, Ohio.

Counties—Adams, Brown, Butler, Champaign, Clark, Clermont, Clinton, Darke, Fayette, Greene, Hamilton, Highland, Madison, Miami, Montgomery, Pike, Preble, Ross, Scioto, Shelby, Warren—21 counties.

TEXT-BOOKS IN AGRICULTURAL EDUCATION SUITABLE FOR THE ELEMENTARY SCHOOLE.

Name of Text-book.	*Name of Author.*	*Publishers.*
Agriculture for Young Folks.	A. D. & E. W. Wilson.	Webb & Co., Minneapolis.
First Principles of Agriculture	Goff & Mayne	Amer. Book Co., Cincinnati.
Agriculture for Beginners	Burkett, Stevens & Hill.	Ginn & Co., Columbus.
Elementary Agriculture	Hatch & Hazelwood	Rowe, Peterson & Co., Chicago.
Agriculture for Common Schools	Fisher & Cotton	Chas. Scribner's Sons, N. Y.
An Introduction to Agriculture	A. A. Upham	D. Appleton & Co., Columbus.
One Hundred Lessons in Elementary Agriculture	A. W. Nolan	Acme Pub. Co., Morgantown, W. Va.
Agriculture in the Public Schools	Lester S. Ivins	March Bros. Pub. Co., Lebanon, O.
Beginners in Agriculture	A. R. Mann	MacMillan Co., N. Y.
Rural School Agriculture	C. W. Davis	Orange Judd Co., N. Y.

PAPERS AND MAGAZINES THAT AID IN THE TEACHING AND STUDY OF AGRICULTURE.

American Agriculturist	Orange Judd Co., New York.
Ohio Farmer	Lawrence Pub. Co., Cleveland.
National Stockman and Farmer	Pittsburg.
Farm and Fireside	Springfield, Ohio.
Farm Journal	Philadelphia.
Poultry Journal	
A Boy's Paper	Carlinville Ill.

AGRICULTURE.

INTRODUCTION.

"Here in the country's heart
Where the grass is green,
Life is the same sweet life
As it e'er hath been."

'Trust in a God still lives,
And the bell as morn
Floats with a thought of God
O'er the rising corn."

'God comes down in the rain,
And the crop grows tall
This is the country faith
And the best of all."

It has been said that to know Nature and Man is the sum of earthly knowledge. But since man is the highest product of nature, there is really but one subject of study—the study of nature. Touch with Nature at first hand is the very breath of mental life. Children are born naturalists. In freshness, in lively interest, in originality, nothing equals a child. Its progress in learning is exceedingly rapid during its first years of life. This splendid growth process of infancy may be prolonged throughout life if the study of Nature has a central place in his schooling, if the love of Nature is implanted, and from it will spring the love of Art, of Science and of Religion. It has been well said that Nature Study is learning those things in Nature that are best worth knowing, to the end of doing those things that make life most worth living. Life is response to the order of Nature. Nature is all, over all, in all. Her laws are unchangeable. Nature is never against us. She is always for us. To have faith in Nature and learn of her is highest wisdom. Nature-study develops the power of observation and is the basis of all agricultural work. In the beginning we must fasten the children's affections on the region in which they are. We must teach them the common things with which they live from day to day. This is the new idea in Nature-study, that is coming gradually into our schools. In time gone by, the common school has had little relation to the life of its community; but it is undergoing evolution and gradually its point of view is being changed. The West has been putting Agriculture into its common schools, as has also the South in great part. It has been discovered that Agriculture may be made the means of training the minds of the young people as well as of giving them information. The study of Agriculture is fundamental. As much so as Geography, Literature or Physics. City schools teach city life and the facts and atmosphere that go with city life, yet many cities

are adding Agriculture because of its broadening influence. If we are to have a healthy country life and a normal country people we must organize schools to teach country life and the facts of country life. We must be able to get good men out of country life by founding and maintaining homes wherein good men of the future may find a place in which to be born. To live in harmony with one's natural surroundings has a moral influence upon character. The boy or girl who takes an interest in growing plants and animals cannot be so bad as the child who does not care for or love these things. There is nothing but goodness in most plants and animals, and the child who grows up in harmony with them must imbibe some of this quality. If the country school is to find its setting largely in the affairs, the interests and aspirations of rural life; if the school in the large city is to make the best use of the materials at hand, the teacher must give the course for this composite Nature-study-agriculture, which will enrich and vitalize other studies and the teacher who handles them as well.. The teacher must be in sympathy with the work and also with the community in which he works. Sympathy is the ability to take another's point of view. It requires a clear head and a warm heart to get the point of view of the child and his environment, but it is necessary in order to lead, to encourage and to assist him to clearer mental vision.

THE TEACHER'S DUTY.

Every teacher ought to subscribe for several good farm papers and read them in order to get the modern viewpoint of the agriculturist. This will enable him to establish a sympathetic relationship with the community which is absolutely necessary before the best service can be rendered. Last, but not least, let every teacher in Ohio do some work in agriculture early this year. Remember, that all we eat, drink and wear comes from the soil. If you are teaching in the country, get your boys and girls to love their homes and to make them the most beautiful spots on earth. If you teach in a town or city, show your pupils that the only life worth living is the country life and to own a forty-acre farm is more to be desired than to become a drygoods clerk or a bookkeeper for some coal dealer. Pupils so trained by an enthusiastic teacher will make a daily advance, not only in agriculture study "but in personal power, in general serviceableness, and in consequent delight."

Training in this subject comprehends all educational aims. It culminates in scholarship, culture and service, and brings happiness to all.

Nature-study must be taught concretely. Books and leaflets are helpful, but will not take the place of the object. There is no textbook of real Nature-study. Teachers, books, and leaflets should be guides to the animals, plants and minerals. The child must see and handle the thing himself if he is really to know it. Nature-study should put him into sympathy with common affairs and the questions of the

work-a-day world and it should give him usable information. Sympathetic and vital contact with his surroundings will create an ever-abiding interest in the mind of the child and help to neutralize the dead formalism of the school. It will open a way to a free, spirited and natural way of teaching and a less restrained and more wholesome outlook on life in the young generation. Nature-study will keep the teacher young and interested in life and enable him to teach with spirit and cheerfulness. What Longfellow said of Agassiz may be said just as well of the teachers and children who have the true spirit of Nature-study:

"And he wandered away and away
With Nature, the dear old nurse,
Who sang to him night and day
The rhymes of the universe.

"And whenever the way seemed long,
Or his heart began to fail,
She would sing a more wonderful song,
Or tell a more marvelous tale."

PRIMARY DIVISION.

Fall Term.

FIRST GRADE.

The Nature studies of the First Grade will be largely informal, dealing generally with familiar material, increasing interest and cultivating habits of obesrvation and description. There ought to be many excursions—if only around the school premises—sometimes on a voyage of discovery, but generally to obtain the necessary material or to satisfy some other definite plan. There ought to be a close connection between home and school, both material and treatment, serving to relate the school to the home. The beautiful in nature will be brought out as well as the useful. The moral side must not be neglected. Accurate observation, telling and doing, will lay deep foundations for a love of truth. Language lessons should be based chiefly on this work in order to stimulate the use of first-hand material, but not every piece of work should end in the inevitable essay.

Discussion of summer experiences and out-of-door activities.

The home and who live there. What does father do? Mother? Sisters? Brothers?

Roms in the house; uses of each, furnishings. .

Schoolhouse; rooms, equipment, uses.

When rooms shold be clean.

Public places; the church, store, depot, town-house, factory, bank, etc. What is done in each.

Make and illustrate a weather chart for each month, serving to teach

days of week, name and character of months, seasons, birthdays, holidays, etc.

Informal field studies: Discover and follow seed dispersals in dandelion, thistle and milkweed. Identify a few common insects, a few most familiar birds, autumn wild flowers.

Plant bulbs of Chinese lily or paper-white narcissus in water.

Visit garden and farm to note autumn activities, harvesting, effect of frost. What the garden contributes; collection and simple study of common vegetables grown above ground; below ground. Draw and color a few. How stored for winter. Where we get vegetables when we have no garden; where the grocer obtains his supply; how he keeps them.

The pumpkin—in connection with Hallowe'en and Thanksgiving; the flower if available; the growth habit of the plant, Jack o' Lantern; preservation of seed.

Distinguish squashes from pumpkins.

Identification of individual trees near school or home, representing by drawing two different species selected from willow, cottonwood, elm, maple and oak. Autumn Arbor Day; transplant small seedling trees.

The first snow fall; observe descent of flakes, catch some upon cold dark cloth and study forms of large flakes.

Animal pets about the home. Animals at work for us. Where kept. How cared for.

Special study of the cat; habits, special senses, mental traits, wild relatives, enemy of birds.

The Christmas tree; purposes, source, decorations; evergreens as distinguished from trees which become bare in winter.

Uses of coal, iron, gold, silver.

Mining, lumbering and farming.

Winter Term.

Illustrated weather chart for each month. Winter games and sports. How winter affects the home activities. The shortened day, noting declining position of sun.

Clothing—Purposes, kinds, changes, care. Primitive clothing. Identification of summer and winter materials. Sources of each.

Shelter—What plants and animals do in winter; why houses are necessary to people; primitive homes; building materials. Uses of doors, windows, screens, storm doors, porches.

Make doll house of pasteboard or box. Equip with furniture, rugs, utensils; preserve distinction of rooms.

Heating the home; kinds of fuel; source and supply of wood; coal and gas; carbon the heat former.

Food—Name articles of food; where food comes from; carbon in food and how eating keeps the body warm; winter sources; home stor-

age; habits in eating and drinking; source of water; methods of cooking; simple lessons of hygiene of nutrition; care of teeth; table manners; thorough mastication; value of good cheer and appetite.

Care of house plants; plant necessities—soil, light, moisture, heat. Identification of a few common house plants; observation and care of bulb plants started in the fall.

The caged canary; habits, care; studied at home; other seed-eating birds.

Breathing and ventilation especially in sleeping rooms. Oxygen, the life-bearer, and how people and animals must breath to get it. Simple lessons in proper habits.

The five senses—Recognition, uses, practice and care of sense organs. Trace the senses among the animals; why absent from plants?

Emergencies—What to do in case of cuts, scratches, burns, nose bleed, frost bites—lessons given as occasion affords opportunity.

The horse—Uses, disposition, habits, care fitness for service to man.

Plant nasturtium in window boxes and in egg shells; later transplant from egg shells to school or home garden; advantages of early planting.

Anticipations of spring; lengthening of days and other seasonal changes; weather, birds, trees—pussy willow, soft maples, elms, weeds, hibernating animals—insects, earthworms, snakes, ground spuirrels; preparation for gardening and lawns. Window boxes. Winter games and sports.

Gather a few pupae for study as they emerge in the spring.

Spring Term.

Continue weather charts.

Spring time activities at home; cleaning house; putting up screens and awnings; change in clothing; cleaning up the yard. Reparis; identification and use of a few carpenter's tools.

Follow changes in willow, soft maple, elm and study these twigs indoors. Opening of flower and twig bud; experiments in growing new trees from cuttings in water, sand, loam.

Early growth of herbs; identification of three or four common weeds and of wild and cultivated plants by means of foliage and habit of growth.

Make home and field acquaintance with a few most familiar birds; seek details of characteristic habits rather than a long list of bird names.

Arbor and Bird Day; indebtedness to trees and birds. Plant seeds of elm, willow andmaple or arrange to obtain them later if they are not now mature; plant cuttings of willow which were started in earlies study;

plant a young apple tree, if one can be obtained; prepare and maintain a food table for birds; hang out threads, string or yarn as nest material; place a basin of water for birds where cats cannot annoy; add mud for robins' nesting; keep cat from harming birds. Songs and recitation about birds and trees,—but better, do things.

The squirrel and his habits.

Identification of a few spring flowers; simple wild flower chart with dates. Transplant specimens to wild flower garden at school and home.

The school garden. As a group, plant flower gardens and vegetable garden. Let each child have a share; develop choice of these plants for garden, planting pop-corn for next winter, and sunflowers for ornament or for food for chickens or other birds. Care of garden. Follow home garden, if a school garden is impossible. Plant nastutiums as border against building, fences or walk.

If possible, study the frog and its development; collection and care of frog spawn or tad-poles.

Life history of moth or butterfly and observations upon specimens that develop from the pupae that have been gathered.

BOOKS FOR TEACHERS.

Holtz Nature Study—Scribners. Hodge's Nature Study and Life—Ginn & Co. Cumming's Nature Study—American Book Co. Schmucker's Nature Books—J. B. Lippincott & Co. Upham's Introduction to Agriculture—D. Appleton & Co.

First Division.

FALL TERM.

(Grades 2, 3 and 4.)

Make carefully planned observational tours to some place, field, garden, meadow, animal home (such as nest, burrow, barn, stable, sty, etc.), woods, flowing stream, spring, pond or lake, orchard, vineyard, factory, shop. Twice a week would not be too often. Let the children know the purpose of your tour before starting. Do not have more than one or two objects in view for one tour. On the following day talk about your tour and what was seen and learned. Collect specimens where feasible. Let the children write compositions on some object they have studied, its use, cultivation, etc., and keep for exhibits at school and at the fair. This may be made a part of the work in language. Some of the reading lessons *may be on subjects* pertaining to agriculture.

Aims of these lessons to the children:

1. Better and growing powers of observation.
2. Thoughtful habits.
3. Knowledge of a special kind.

4. Power of comparison acquired and the ability to distinguish objects—dissimilar and similar.
5. Storing useful information.

The oral and essay work may include description of the objects, their uses, cultivation, etc., in language and terms understood by the child. All this may in many ways be used as a part of the recitation in other branches—as language, number work, oral geography, in fact the reading lesson some times may be upon subjects pertaining to Agriculture.

Make much of the exhibits of the work of the children; keep it and show it in the school room on special days and send it to the fair as a part of the school exhibit.

Trips with the following in view: Effects of the frost; sprouting of the wheat; corn well shocked; birds yet to be seen; quail haunts and protection of these birds; the apple orchards; apple picking; making cider; marketing the apples and cider (something of vinegar may also be learned); digging and marketing potatoes and sweet potatoes; growing garden products; wild flowers; the forest trees getting ready for winter; make a collection of all kinds of seeds; spirrels; catterpillars and other small animal life, as time and the progress of the class will permit.

What to observe:

I. Around the farm home: The flowers, the shrubs, the fruit and shade trees, the plants of the garden, the grains in the grainaries and cribs, preparations for winter feeding, and housing, care of the farm animals, the pets of the children, the poultry; name the farm machinery and tools, and note the care of them; weeds, insects and birds.

II. On the farm: The plan of laying out the farm, names and number of fields, the woods, the fences, farm crops harvesting of corn; the weeds and flowers; the trees in the woods, the trees along the roads and lanes, the shade trees and the fruit trees, the farm animals and their uses; the farm products, the selling and marketing of the same or their preservation.

Continue weather observations. Note the time of the first frost and the first snowfall. Is the first frost more severe in high or in low places?

Gather all kinds of seeds and place them in properly labeled bottles for study and display. Get the children so familiar with them that they can distinguish them one from the other.

Preservation for winter and spring use of apples, potatoes, celery, cabbage, sweet potatoes and pumpkins.

Seed distribution: cockelbur, Spanish needle and burdock stealing rides on animals and people. Hickory nuts, walnuts, acorns and beech nuts carried by squirrels. Squirrels gather beechnuts into piles, which are sometimes discovered by boys. Seeds like those of cherries and berries carried by birds. Seeds of tumble grass blown by wind.

Value of warm and sanitary stables for farm animals and poultry.

Observe the flocks of blackbirds in autumn and find out where they go. Study the migratory habits of birds. What birds remain with us all winter and what do they eat? Teach the children how to keep the birds with us all winter.

How to protect rose bushes, strawberries and rhubarb for winter.

Preparing for and sowing wheat, corn cutting; the shock; naming all parts of the stalk; the silo; the pumpkin crop. Uses of garden products and fruits; canning of fruits. The value and beauty of shade trees; beautiful color of leaves in autumn.

General Suggestions and Hints.

1. The water in streams is muddy after a heavy rain because it is carrying soil and clay. Allow a tumbler full of muddy water to stand till mud settles. Pour off the clear water and allow the mud to dry. Examine. Streams wear their channels deeper and ravines are slowly formed. Teach this in connection with oral geography.

2. Boys and girls do not like to eat the same thing all the time. Same is true of our domestic animals. Balanced rations needed for both animals and people. Teach this in connection with oral physiology.

3. First lessons in sowing and planting are most impressive—the more so if the children do the work—all the work. Try it; have them plant at least one tree in October, let them do all the work, for they will be happy at it and happier in the spring when they see the leaves. Let them test some seed wheat in the seed tester.

4. Get some bulbs and have the pupils make a bed and plant them; you will all be delighted in the spring to see the bloom, and then you will have some material for spring study. Then do not forget that all this work at school is not yet what it should be if some of the same work is not done at the home of each and every child in these classes.

5. A trip to see some one thing of special importance—a tree for its foliage or fruit, its leaves, or signs of disease; to see a fine flower or garden bed; to look up the haunt or the nest of a wild animal or bird.

6. Young as these pupils may be it is the time to interest them in agricultural literature. Have the farm papers and nature study books at hand and assign short pieces to be read privately and reported to the class orally.

7. Have an exhibit of the work done at least every two weeks and invite the patrons in. Keep the best of these exhibits of every child's work for a general school exhibit of the township or village; keep the best of the township exhibits for the County and State Fair exhibits.

8. Let the teacher come to this task with a will to do as well or better in this subject as in any other. The next step will be to demonstrate to the pupils that the farm on which they live is their home and is just as

full of life as their own flesh and blood; it is not essentially a dry and disinteresting expanse of lifeless dirt and stone; above all, it is not a less refined place to live than the city, or the village—these ideals must the successful teacher love and enjoy.

9. A Woman's club of the women and girls of the vicinity would be a most valuable aid in all the grades in working with the teacher in carrying the good things of the school to the homes and in return the school would get many helps from these women and from the homes that would connect the school and the home and carry into effect the suggestions of this course and any of the plans of the teacher. The study of all the plants and animals would be promoted by such a club; the beautifying and sanitation of the school and the home would receive a great impetus from even a small club; pictures on the walls, books for the school and people of the neighborhood, the janitor work, the school grounds, etc., are some of the subjects that such a club would take up and work out.

WINTER TERM.

(Grades 2, 3 and 4.)

See suggestions in the Autumn Bulletin. Keep in mind the aims of this work on page 8 of the Autumn Bulletin.

Retain many of the specimens of the autumn work for the Fair exhibits and for the winter lessons.

The reading class, the oral geography and physiology classes are timely places for much recitation work in this subject. Assign a topic now and then to be worked out in these classes. Read about some subject appropriate to the grades and the season.

Observation trips with the following in view:

The condition of the lawn and garden so as to endure the hardships of winter and to be ready for the spring planting; the orchards and fruit lots, the buds, the sap; do all trees shed their leaves at the same time?

Farm Animals:

The care and shelter of farm animals during the winter months; the bridle bit should be warmed on a cold morning before put into a horse's mouth; the feeding of such animals; the care of the stables, poultry houses and cellars. The farm shop and the tool shed, name of each tool and its uses, and care of these. The expectation of these observation visits will have a most salutary and uplifting effect on the farms and in the homes that you visit.

The Birds—Those that have migrated; those that will remain all winter; the feeding and housing of these birds and does it pay.

Bird houses—The manner of living of winter residents, uses to the farmer, many birds die of cold and hunger; how we should care for them. How coax them to stay all winter and make a permanent home around the home of the boys and girls.

The frost and its effects—The frozen plant, frozen fruit, and frozen water, how protect from the frost, a strawberry bed prepared for the winter, fruit and vegetables preserved in cellars.

Continue weather observations. Learn to locate and recognize the Great Dipper, the North Star, the Pleiades, Orion. Note the elevation of the sun at noon, and if there is a south window; how far the sunlight shines into the room; the time and place of the rising of the moon and sun and something about the phases of the moon.

Special study of the cat, of the dog and two or three other farm animals; their habits, senses mental traits, food uses, domestic and wild relatives.

Teach the reading and uses of the thermometer. Study how the house is heated, how ventilated; value of sunlight, uses of sunlight, power of the direct vertical rays over indirect or slanting rays; all kinds of fuel.

Study of different soils after the crops are harvested and where the ground is bare. Pick up stones that show effects of weathering. Stones decay. This decayed stone material mingled with vegetable matter forms soil. Compare with rusting of iron.

Make collections of such seeds as are to be found; learn to name each when presented separately; let each pupil make a collection for the school and fair exhibits. Seeds of orchard fruits and garden vegetables may be arranged in exhibits and learned by sight by these pupils. Make a seed tester and get ready for the seed testing; let the children take an individual part in all this work.

The limbs and branches of the different kinds of trees—evergreens, forest and fruit trees—may be seen and studied at different times so as to note difference in structure and buds. Compare leaves of evergreens with those of the deciduous trees.

Ears of different varieties of corn may be brought to school and studied; size of grains and their quality, size of corn on good ears and on the improperly portioned ones, varieties of corn in the immediate neighborhood, popcorn and the popping of it; the study of stover, forage, meals and other feeds; the care of the corn cribs; the prevention of rat, mouse and other destruction of the grains; the shelling and grinding of corn.

The poultry yard; the care of the laying hens; gathering of the eggs, the care and cleanliness of the hen-house. Let the pupils construct the buildings out of paper, showing nest and roosting places.

Put some seeds to soak now and then and have the pupils write and tell orally what they see. The value of the proper care of all seeds during the winter can now be well taught and thorough learned.

Visits to a market to see and learn the marketing, the names of new objects, the buying and selling, the care of fruits, vegetables, etc., and preparation of these to be bought and sold. The shipping of vege-

tables not native could be the basis of a fine lesson in agricultural geography.

Have experiments with the growing of cuttings, seeds, bulbs, etc., in boxes of loam or sand. Study these and have the observations written up and told by the pupils from time to time.

Study native wild animals, its habits, covering, home, hibernation, etc.; have the pupils learn the native wild animals.

It is not necessary to separate the nature study and the study of physiology in these grades. The physiology and hygiene of the farm animals can be well taught in the oral work in physiology. See Autumn Bulletin and the Course of Study.

The minerals of the neighborhood, the soils, etc., are splendid subjects for nature study work at this season of the year.

General Suggestions.

1. The trips in the winter season should not be as long as at other seasons, they may be more specific so as to take less time if the weather is bad.

2. The work of the autumn should often be recalled and reviewed; specimens should be gathered and collections made that make a good exhibit. These should be preserved and shown at the school displays and at the fairs.

3. Effects of heat and cold should be well taught,—effects upon plants and animals.

4. Better farmers and farm life should be a constant aim in all this teaching. While we teach clean fields and gardens, we also teach clean bodies and minds in our pupils and the result will just as certainly be reflected in the citizenship of the future.

5. The habit of killing the wild animals and birds is now as never before a fruitful line for thought and should be counteracted by skilful teaching as fast as possible by creating different ideals and teaching the real uses of the different birds and animals; most of them are very useful.

6. The helpful sympathy and encouragement of the patrons in this teaching is also to be an aim; that they too may learn is to be expected for they never had the opportunity to study these things in school. So teachers of boys and girls are also teachers of men and women both of the present and of the future.

"I will walk abroad; all grief shall be forgotten today; for the air is cool and still, and the hills are high and stretch away to heaven; and the forest glades are as quiet as a churchyard; and with the dew I can wash away the fever from my forehead, and then I shall be unhappy no longer."—DeQuincey.

7. The winter months are the ones to use especially for exhibits that public should see, for it is at this time of the year that people like

to be entertained; exhibits of garden products that are being kept over, of soils and soil testing, of grains, fruits, insects, seeds of all kinds and seed testing, plans for the farm and for the garden for the next year, drawings, paintings, articles sewed, embroidered, etc., all make fine displays and each has its lessons for the children and for those who see. Contests if conducted without friction are also good drawing cards for a school exhibit. Let the bulletins, books on Agriculture and Nature Study, and the courses of study be parts of the exhibit at all times.

The materials for the County and State Fair exhibits can easily be taken from these displays and preserved until the time they are needed to be prepared for the fairs at the close of school.

First Division.

SPRING TERM.

(Grades, 2, 3 and 4.)

In addition to the aims set forth on page eight of the Autumn Bulletin, one more aim needs to be kept in view in the spring work in these classes, namely: The value of proper preparation for the planting in every detail—selecting soils, preparing soils, selecting seeds, tools in order, fences in order.

Investigate the results of previous work, such as looking into the hot beds and cold frames and the starting of such if not already done; the examination of the rhubarb and strawberry beds; the hyacinths, jonquils, crocuses, and tulips are very interesting study now when the children are so anxious to see something growing; the onion and lettuce beds should be well along, especially the former if there was any fall planting; transplant wild flowers and plant seeds; the fall work for the extermination of weeds by destroying the old weed stalks and seeds by burning will now show its results and the attention of the pupils ought to be called to the value of this kind of work.

Around the farm house notice the condition of the flower beds, the garden and the fruit orchards; complete the preparation of these for the Spring planting and for the proper cultivation, fertilizing, spraying, etc. Learn the names of the different trees and plants found on the grounds; the walks and roads around the farm home and how to make them and keep them in order. Examination of the seed collections to see if they have kept well; planting seeds from these collections to see if they will grow. Note how the seeds have been preserved in different homes and call the attention of the children to the best methods of preserving grain, fruits and seeds of all kinds.

Get a measurement of each of the gardens represented in the class and use it in the arithmetic classes and for the purpose of planning what to plant in them. Study the plants and plans used the preceding year or years and teach the pupils how to improve upon them as to the beauty

and utility of the gardens. Have the children draw plans for the flower and garden beds and for the whole lawn and garden at their homes; visit some of these that are well planned and point out the various useful and beautiful phases of each lawn and garden. Call attention to trees and other objects in the garden. Is it a good thing to have trees in the garden? Why, or why not?

Plant some flower and garden seeds in egg shells and in the seed tester; show some seeds growing on wet cotton or under wet cloth; transplant the young plants, teaching the children how to do the work so as to be successful, using great care to every detail and that the pupils grasp the idea of each step; have the pupils do the work and use all patience with them in their every effort; if any fail, have them try again.

Visit some homes for the purpose of observing the house plants; it may have been well to have told the pupils that such visits as these would be made and then each home would have striven to have had something to show to the classmates when the observation visit was made.

Continue weather observations.

Study dew, rain and fogs.

This work can be best studied by trips to the woods, streams, railroads and other places of interest.

Trips to the woods to watch the new buds open, to name the trees, to learn to know the trees by their foliage, bark and general outlines, also study the blossom.

Other trips to these woods to study the birds, their habits, their home-making, their food gathering and their real uses to the garden and farm. The names of all the birds that remained over winter should have been well learned and then as the migratory birds come back in this season their names should be learned and the bird studied. Teach early in the school life of the child the useful birds and teach the special uses, and then we will all learn how few of the bird family there are that are not useful, for very many that we in the past have called enemies are in reality our friends and help very materially in the holding in check of the destructive insects; then back of the songs you and your pupils can hear on your excursions, think of the beauty of color and happy bird life you can see and feel.

The building of bird houses, the collection of material for the nests, and how the children can aid in this, the actual building of the nests, the eggs, the hatching and feeding the young, the rearing of the young and the flight from the nest. A most important element to be taught is the protection to be given these bird friends. With the forests thinning out more and more, the birds must be encouraged and assisted to make their homes with us.

The language work is alive when we use such topics as birds, bird life, and excursions among the birds as the basis of our language work;

such material is here found and it is a live matter in one channel of book language work year after year.

A trip to the banks of a stream to observe the flow, the drift and sediment carried, the deposits along the banks, the effects of the currents and eddies, the flow of ditches, springs, smaller streams, etc., into it, all have a special meaning. If thoughtfully planned as a class affair and as a recitation these trips will dawn upon the pupils as lessons in drainage, on erosion, on fertilizing the land by deposits of the overflow of streams, on the value or harm of running streams, upon the health of the people by carrying away the refuse, garbage, etc., and, in addition to all these objects the subject of commerce over the running streams may be elaborated upon and then lead the children from that to the study of commerce upon the canals, lakes and oceans.

A trip to the railroad depot or to the railroad to see the trains load and unload the express matter and freight, or simply to watch the trains pass and observe the products the trains carry to and from the neighborhood. Also study the other products carried to the farmers and observe the people traveling.

Many children and others, too, do not know the different plants — both wild and domestic — in their very young state; so a trip now and then to study the young flowers, weeds and vegetables, to know them by their earliest leaf productions will be worth while. Some of the seed collected in the autumn ought to be planted and the growth watched from day to day. By this method the pupils will recognize many of them.

The results of these trips can be worked out in the oral agricultural lessons and in the language work. The collection of interesting objects of study should be a very important part of every trip. Young as these pupils are they can be taught some of the diseases and the most harmful insects that visit the orchards and fields. The results of these trips to a language or geography class will rejuvenate the spirit of these classes even if the pupils do not understand all the technical parts of the subject.

SOME BOOKS FOR PUPILS OF THESE AND THE FOLLOWING GRADES.

Farm Friends and Farm Foes	D. C. Heath & Co.
Elements of Agriculture	D. C. Heath & Co.
Nature Study Readers	D. Appleton & Co.
Elements of Agriculture	D. Appleton & Co.
Playtime and Seedtime (series)	D. Appleton & Co.
Nature Study in the Elementary Schools	The MacMillan Co.
Uncle Henry's Letters to a Farm Boy	The MacMillan Co
Nature Study (A series)	American Book Co.
Birds through the Year	American Book Co.
Ten Common Trees	American Book Co.
In the Year Round (series)	Ginn & Co.
Friends and Helpers	Ginn & Co.
Stories of Insect Life	Ginn & Co.

Life on the Farm..... A. Flanagan Co
Great American Industries ..... A. Flanagan Co.
The Corn Lady ..... A. Flanagan Co

Second Division.

(Grades 5 and 6.)

FALL TERM.

Sources of Information.

In this division pupils should be taught the sources of valuable information for the student of agriculture. Important information can be secured from the following departments:

1. United States Department of Agriculture, Washington, D. C.
2. Ohio Agricultural Experiment Station, Wooster, Ohio.
3. State Board of Agriculture, Columbus, Ohio.
4. State Commissioner of Common Schools, Columbus, Ohio.
5. The State Supervisor of Agriculture in your district.
6. The Agricultural College, O. S. U., Columbus Ohio.

The Ohio Experiment Station, The Agricultural College, and the State Board of Agriculture and the department of the State School Commissioner send instructors and lecturers where the public may require their assistance.

It is the duty of the teacher to encourage cooperation between the community and these departments that are prepared to give assistance in agricultural instruction.

To know how and where to get information is part of an education. The teacher can show that agriculture is one of the broadest fields for the development of the intellectual powers; that it is the study of the three great kingdoms of nature; the mineral kingdom, the vegetable kingdom and the animal kingdom.

Write for Bulletin 19, Division of Publications, U. S. Department of Agriculture; this is a classification of all the publications of this department for the use of teachers.

There is such illustrative material that can be obtained free of cost by those who will take the pains to write for it; teachers can also secure from manufacturers, many samples of manufactured products, for school exhibits, to show what can be made from the raw materials of the farm.

Send to the U. S. Department of Agriculture for alfalfa cultures for experimental purposes; food products, maps, metric system charts; chart of the classification of clouds; a territorial map; and other similar publications from the government.

The Community.

This work should begin with a study of community life. The child should know the people of his community, and how they live;

how the community supports itself, and its relation to the neighboring communities; how churches, schools, roads, telephones, telegraphs and mail routes and many other modern conveniences come to be here; pupils should be taken on trips to visit shops, mines, and factories where they can have an opportunity to see different classes of the leading trades of the country; let them see the working of levers, pulleys, derricks, cranes and steam shovels; examples of water power, steam, electricity and gas. Let them see the traffic of the city and the different occupations represented; transportation, commerce and manufacturing; methods of transportation on lakes, rivers and canals; on railroads and public highways.

Study the subject of soils; how they were formed; the lay of the land and how it is drained; what the farms produce and why; road building methods; tools and materials used in construction; costs and benefits to be derived. Teach the important facts pertaining to the community.

Let the children go on excursions from the city to the country; let them come in touch with rural life; let them see some model farms with their well kept and well arranged buildings; the barns filled with grain, feed and well kept stock.

These trips may be used to furnish material for composition and language work.

Plants:

Continue garden work started in spring; care of strawberry beds and plants, raspberries and other plants in winter; tree planting in the fall; study contrast between evergreen and deciduous trees; plant nuts, peach seeds, acorns, and other seeds that come up the following spring.

Study the coloration and fall of autumn leaves; study changes as they take place in the oak, maple and a few other trees; make collections of leaves, of the walnut, elm, oak, willow, basswood, apple, thistle, clover, timothy, and other familiar leaves; arrange collections artistically on cardboard, in herbariums, or in some manner suitable for displays at township or county exhibits; leaves can be assembled in groups from their resemblance in venation, in base, in apex, in margin. Learn to recognize the leaves of each kind of tree represented in your collection.

Make a collection of different varieties of wood found in your part of the state; cut into sections or blocks of uniform size and length; show effects on the grained surface by cutting blocks lengthwise and at different angles; quartersawed; effects of planed and polished surfaces; modes of finishing woods.

Learn to recognize and name the different kinds of wood from the characteristics of the bark; the sawed surfaces; the rough; the polished sides.

Study the formation of grain; the texture and arrangement of cells; the rings of annual growth.

Study commercial uses and values of each; make a list of different kinds of woods and explain how used in construction of dwellings.

Study the woodman's life, forest and game preserves; conservation of our forests; natural resources; coal; waterpowers; water rights; iron; lead; copper; mines.

Make a drawing of a corn plant which has been carefully taken up by the roots. Cut across a piece of stalk; cut it lengthwise and examine structure; examine threads, air ducts, and outer part of stalk; note arrangement of leaves; circulation of sap; observe position of roots; study effects of cultivation, examine tassel; stamens; pollen; pistils.

Remove husks carefully from ear of corn; examine silk; fertilization; make collection of different types; study history; statistics; make collection of ten good ears; study uniformity; shape; weight; study kernel; draw diagram; structure composition; locate color, starch, gluten, hull, germ, tip and crown; observe number of rows, sides of kernel, embryo; study feeding value, and commercial value; manufactured articles.

Make a collection of apples from your neighborhood; study color, flavor texture; market value, adaptibility, keeping quality; cut crosswise and lengthwise and make drawings; observe star shaped arrangement of seeds; name parts; name parts of flower and show what part remains on an apple; study other fruits in same manner; preservation, preserves, uses, manufactured products.

Animals:

Make a list of the animals of the farm, forest, stream in your neighborhood; this will include mammals, birds, reptiles, fishes, frogs, insects; and other animal forms; explain difference in life; study beneficial and injurious forms; when possible make collections; make list of most useful and most injurious animals; make a comparison of the respective values of horses, cows, hogs, sheep, cattle, and poultry; make a list of the manufacturing industries dependent upon these products of the farm.

Make a comparative study of the acorn and the egg; of the life of a tree and a bird; of the life of a frog and a fish; of a bee and a butterfly. Identify fish of the neighboring streams; those on the market. Study methods of catching, fish culture; learn the classifiaction of a few such animals as the snail; tortoise; clam; eel.

Study migration of birds. (See course of study.) Study care and protection of birds that stay with us over winter. Study birds as seed and worm destroyers, classify the birds as birds of prey; songsters; waders; climbers; game birds; domesticated fowls.

The Ohio Experiment Station has prepared a bulletin on Ohio birds. It has been prepared expressly for the use of Ohio teachers, and will

be mailed to you by Sept. 1, if you will send your address to the station at Wooster, O.

Write to the National Association of Audubon Societies, 141 Broadway, N. Y., and ask for samples of leaflets, and directions for organizing a Junior Audubon Class for bird study. Send for Special Leaflet No. 22.

Have a lesson on the grasshopper. Make a collection of grasshoppers; name different parts of organs; legs, head, tail wings, feeders; count the legs as they are on the thorax or abdomen. Note their arrangement; observe shape and difference in size; shanks of hind legs; examine the antennae. Where is the grasshopper's backbone? Observe differenc betwen vertebrates and invertibrates.

Make a similar study of the honey-bee; the cricket; house-fly and other insects. Study manner in which insects produce sounds.

Drawing. Study colors and drawing.

Without drawing and coloring, our study of flowers, birds and insects will fall very far short of serving its highest purpose; observation, imagination, and creative power must go together. The Audubon Leaflets with outlines for suggestions and colorings can be of great assistance.

Minerals and Soils:—(*See course of study.*)

Make collections: pebbles, rocks, minerals, fossils, arrow heads and other relics of America's early inhabitants. Observe evidence of glacial period; evidences of lake beds; study bottom lands and source of alluvial deposits; difference between soil on high and low grounds; identify rocks and soids; study origin of gravel, sand, silt, clay, loam, muck, effects of atmospheric agents and elements on wearing away of hill sides; courses of streams; disintegration of rocks.

Farm Lands:

Let pupils use sand to show topography of immediate locality; draw map of a well drained farm and illustrate elevations, depressions with relief worked out in sand; show water courses; arrangement of fields. Show location of buildings, orchards, wells, woodlands, pasture lands, crops and other important features of farm management.

Study preparation of lawns; arrangement of trees, shrubs, vines, flower beds; seeding, rolling, watering, fertilizing, weeding, study plans for beautifying home grounds and dwellings; study advantages of order, arrangement, system, cleanliness and sanitary conditions in all the buildings and their equipments and environments.

WINTER TERM.

Follow the directions in the tentative course of study.

The teacher can give agricultural instruction every hour of the day by correlating it with every branch taught in the common schools.

Composition and Language:

Obtain colored pictures of famous paintings; there should be pictures of animals, rural scenes, and landscapes hanging on the walls of the school room. The pupils should be required to talk and write of their trips to the rivers, woods, fields, barns, factories and cities.

Reading:

Select lessons in reading adapted to the season and to the subject to be studied; read from books on nature; text books on agriculture. When studying birds read from the best selections on birds by the best prose and poetical writers; (see list of selections and books). Make reading the exponent and vehicle of good things.

History:

Study causes for the agricultural and industrial development of the U. S. Study the progress made in labor saving machinery and its influences on different parts of the country; study the history of corn and other products; learn something of the life of Luther Burbank, Thomas A. Edison, and other men of science; rather than warriors.

Physiology and Hygiene:

Make a comparative study of the structure of the physical organism of man and some of the lower animals; send for the "Farm, stock and Family Chart," by the Orange Judd Company, New York. Send to The U. S. Dept. of Agriculture and get the Food Products Maps; these will faciliate the teaching of composition of food materials; study hygienic laws in construction of farm buildings; care of animals; study sanitation with reference to water supply.

Geography:

Study the map and learn the location of the region producing each of our leading agricultural products; study the states that lead in the production of each; explain causes for difference in products; construct relief maps and product maps; arrange a corn map, a map showing location of other staple products and also an animal map; send to Washington to the department of agriculture and ask for Crop Reports published by the Secretary of Agriculture which will show distribution of products and give valuable statistics; this will furnish such supplementary work correlated with Geography.

Arithmetic:

Give supplementary problems with the lesson in arithmetic; have practical agricultural problems; they should combine the facts of agriculture with mathematical training; feeding problems; balanced rations; nutritive ratio; mixing of fertilizers; mixing sprays; construction of buildings; silos; cribs; granaries; tile drains; fences; road building; ditching; problems in seeding; planting and harvesting of wheat, corn and other crops; marketing; egg production; trade problems; make all

problems practical and applicable to the every day transactions of the community by consulting the daily market reports.

Plants:

Study a tree and name different parts; functions of parts; plant foods; sources of nourishment; study relations of air and leaves; roots and soils. Learn to recognize some of the common trees of the forest; name the best kinds of firewood; some of the best commercial woods; study treatment for lengthening the durability of buildings, post, ties, paving blocks, shingles.

Review study of your flower and weed specimens in your herbariums; Distinguish underground stems, bulbs, and tubers from roots; collect exhibits of each.

Study plans for the home garden; for experimental plots; make collections of flower and vegetable seeds; prepare seed testers; construct cold frames, hot beds and study methods of propagating plants.

Send to some good seed house for catalogue; make selections for spring seeding; toward spring test the germinating power of seeds.

Send to the Ohio Experiment Station for the following bulletins: The spray bulletin; The Ohio Weed Manual; Ohio Plant Diseases.

Discuss plans whereby a boy could produce the greatest income from an acre of ground; a farmer on ten acres; on twenty acres; on forty acres; on eighty acres.

Have corn judging contests; organize for a corn growing contest; form boys' and girls' agricultural clubs.. Hold agricultural exhibits. Write to your supervisor of agriculture for infomation and plans.

ANIMALS:

Observe how the chipmunk, woodmouse, woodchuck, and muskrat prepare for winter; how they live; animals that hibernate; make an investigation of what becomes of certain insects and snakes in winter.

Household Pests:

Study methods for the destruction of mice, rats, flys, mosquitos, moths and other vermin; send to the U. S. Dept. of Agriculture for the following bulletins: (Farmer's Bulletins.)

155. How insects affect health in rural districts.
459. House Flies.
369. How to Destroy Rats.
383. How to Destroy English Sparrows.

Send to the bureau of entomology circulars, U. S. Dept. of Ag. for circulars:

34—House Ants; 36—The true Clothes Moths; 47—The Bedbug; 48—The house Centipede; 51—Cockroaches; 71—House Flies; 108—House Fleas.

Send for circular 76—List of Publications of the Bureau of Entomology.

Name the fur-bearing animals of your locality; explain causes for difference in values of winter and summer furs; name some animals that yield most valuable furs; effects of cold weather on the hair of domestic animals; observe effects of blanketing horses; note the change of colors between summer and winter in fur-bearing animals.

Observe difference in quantity of feed required between summer and winter; explain causes; explain balanced rations; why hens fed on corn alone may be fat, but not produce many eggs; observe difference in feeding beef and dairy cattle. Will a feed that produces fat be the same as that that is a good producer of milk?

Study the products of milk and beef; name the uses of hides, leather, bones, tallow, fat, hoof, hair, and other parts of slaughtered animals; what great industries are dependent upon the production of cattle, sheep, hogs and poultry?

Observe difference between herbivorous and carnivorous animals; name some that live on both flesh and vegetables; study the dog and his relatives; the cat and his relatives; name some animals that live in water and some that live both on land and in water; can we always distinguish clearly between plants and animals? Between organic and inorganic bodies?

Make observations and collections to show how closely the three great kingdoms of nature are merged into one another; that we can scarcely draw the lines of demarkation.

MINERALS:

Secure specimens of iron ore, different kinds of coal, limestone, sandstone, shale, marble and granite; explain how coal is formed from vegetable matter; limestone from shells; sandstone by nature's process of cementing together grains of sand; how shale is formed from mud; uses of limestone, sandstone and granite for building purposes; stones used for road building; how lime is obtained from limestone.

Have a specimen of a well weathered rock; study how clay is formed; sand; pebbles; explain how the different agencies have transformed the rocks into different types of soil.

Study soil water; make experiments to demonstrate permeability and capillarity of soils; show the ascent of water in dry soils by use of glass tubes or lamp chimneys; make experiments to illustrate the process of osmosis; show effects of working clay soil when wet; show effects of a mulch to retain moisture; explain irrigation; test soils for acidity; show effects of freezing, lining and humus on a clay soil.

FARM MANAGEMENT:

Water—

Study different sources for securing water; artesian wells; open wells; waterworks; filtered water; sterilized water; difference between soft and hard water; difference in the city and farm method of getting

water: study types of pumps and windmills; resorvoirs, tanks and cisterns; methods of heating or cooling for house use or for stock; study how water may become contaminated and contain disease germs such as typhoid; explain danger in using cups found at public drinking places; study new sanitary methods for drinking places.

Lighting and Heating:

Study systems of heating; the fan, steam, hot water, and gas systems; wood stoves and coal stoves; the fire place; study chimney construction; protection from fire; study combustion; effects of oxygen; observe movements of cold and warm air; explain principles of ventilation; study principles of the kerosene lamp; of electric lights; gas lights; send to the Standard Oil Company for samples of the products of oil; study nature, use and dangers of gasoline, acetyline, benzine, electricity.

Tools and Farm Mechanics:

Send to the Wooster Station for a bulletin No. 227, Farm Equipment; make a list of the tools needed on a farm of 80 acres; study cost as given in above named bulletin; study losses caused for want of care; name the tools that belong to a carpenter's outfit; name some tools every boy and girl should learn to use; study care of tools; preventing rust; name tools of a blacksmith shop.

Study principles involved in the construction and operation of farm machinery; mower, reaper, fanning mill; separator, cream separator, milk tester, pumps, wind mills, engine, electrical apparatus, water power, spraying machinery, seed drills, and other important and complex machines of the farm.

Schools should have courses in manual training; domestic science; there should be baking contests, sewing contests; instruction in a household economy; learn to construct handy household articles; ironing boards, broom holders, shelves, cases, boxes, and other useful articles.

And last and above all things else, let the boy have his pocket knife for,

"In the education of the lad,
No little part that implement hath had,
His pocket knife to the young whittler brings
A growing knowledge of material things.

Projectiles, music, and the sculptor's art,
His chestnut whistle and his shingle dart,
His elder pop-gun with its hickory rod,
Its sharp explosion and rebounding wad,
His corn-stalk fiddle, and the deeper tone
That murmurs from his pumpkin-stalk trombone,
Conspire to teach the boy. To these succeed
His bow, his arrow of a feathered reed,
His windmill, raised the passing breeze to win,
His water wheel that turns upon a pin,—

Or if his father lives upon the shore,
You'll see his ship, "beam ends upon the floor,"
Full rigged, with raking masts and timbers staunch
And waiting near the washtub for a launch."

Help the boy to construct these contrivances. Let him observe and do things. Read poems and prose selections that show great powers of observation, such as "The Barefoot Boy," and "The Brook."

Rural Economics:

Study the relation between location and value of farms; between fertility and value; between fruit, grain and stock farms; points that determine the value of land; why some farms are neglected or deserted; study the laws of supply and demand; location of the best markets; cost of production, transportation and marketing; study crop reports; study the shortage of crops and find the probable demand and produce accordingly.

Study the ten great virtues in crop production and farming:

1. Thorough drainage.
2. Soil fertility.
3. Early Plowing.
4. Thorough preparation.
5. Tested Seed.
6. Scientific Cultivation.
7. Clean crops.
8. Timely harvesting.
9. Highest prices.
10. Judicious investments.

Discuss:

Methods by which our mails are carried; distribution; different kinds of roads; effects of good and bad roads; on our mail delivery, business; schools, health, transportation and civilization.

How the school can be made the social center of the community; reviving the spirit of the old spelling school; the debating society; the literary club; make the school the home of the domestic science contest; the agricultural exhibit; the lecture course; the public forum; a place for paintings, sculpture, music, books, flowers, and happy children.

PLANTS:

Begin study of flowers with their earliest appearance in the spring; eachhh pupil should be provided with hand lens and herbariums; make collections of flowers and plants; press and place in herbarium; make drawings and write descriptions.

Study seeds, roots, stems, buds, leaves, flowers, fruits, and functions of each.

Study economic importance of seeds; as a source of food; list of foods from seeds; why food is stored in seed; compare plant food with animal food; food substances contained in seeds-sugars, starches, oils and proteins; name articles manufactured from the kernel of corn; from other grains; how does the ox prepare the food for us? The cow? Make a microscopic examination of a seed and name parts; by what agencies does nature disperse seeds? Make collections of seeds and arrange in small glass vials.

What forces are necessary for the germination of plants? Name some seeds that germinate first in spring; those that require the greatest amount before germination; conduct experiments to demonstrate effects of different degrees of light, heat and moisture on germination and growth of seeds; construct seed testers; place seeds in glass jars against the sides so they can be seen after being covered with oil; watch germination and growth; watch the development of the organs of vegetation; roots, stems and leaves..

Roots — Watch the formation of roots, root hairs; the root cap; note growth of stem and root in opposite directions; study anatomy of root and name parts; kinds of roots; compare roots of oak, corn and turnip; examine roots of air plants and parasitic plants; examine change of root of biennial plant the second year; why is it dry and tasteless?

What difference do we find between the growth of a sweet potato and an Irish potato? Which of these is a root? Which is a part of the stem? What is a tuber? What difference is there in their propagation?

Study difference between stems and roots of plants.

Stems:

Examine stems of potato, onion, radish, calamus, timothy, cane, mullein, maple; what are the functions of the stem? Make a list of stems of familiar plants; study difference between a corn stalk and trunk of an oak; observe that one grows from the inside and the other from the outside; observe difference between herbaceous and woody stems; difference between twig and trunk of an oak; study difference in stems that stand upright, those that twine, and those that trail upon the ground. Explain as to direction of growth of grape, ivy, strawberry and raspberry.

Make a list of stems used for food; for building purposes; from which we get products such as turpentine, syrup, sugar, molasses. Study trees that have valuable bark, roots, fruit and leaves. Compare the variety of economic products from the different parts of plants and decide which part is most valuable. Explain causes of knots.

Buds:

Compare a lily bud with the bud of an oak. Observe the several modes of arrangement of buds as they appear on stems; terminal and auxillary. Observe nodes and internodes; leaf scars; arrangement and

use of scales. Notice difference in branching of elm, oak, beech, pine, fir. Why is this difference? How does it affect the beauties of the winter woods?

Cut buds transversely and longitudinally and examine closely. Examine the folded leaves and position of flower cluster.

Leaves:

Examine a young healthy leaf; name parts; uses of each; relation between shape and arrangement; external characteristics; internal structure; transpiration; respiration; the fall of the leaf.

Flowers:

Inflorescence; kinds; essential organs; stamens; pistil; pollination; the ovary; make a horizontal diagram of the whole flower; make a vertical diagram; point out the sepals and petals; all important organs; fertilization; modes; hybrids.

Fruits:

What is fruit? Is a watermelon fruit? Use of fruit to the plant; name parts of an apple; examine stone fruit; explain difference between drupe and berry; explain difference between grains and legumes.

Name the ten chief elements of plant food; which of these are least abundant that usually have to be supplied to our soil? When a plant is burned what elements escape in the form of gas, as smoke and watery vapor? What remains in the ashes after combustion?

Study difference in varieties of plants; differences in same variety; study causes; how do we improve plants? Why should we study heredity and environment when selecting seeds and plants for propagation? Can we make a good selection of seed without seeing the whole plant?

Send to the national department of agriculture and ask for the following bulletins: Farmer's Bulletin, No. 157. Propagation of Plants. Study different methods; spores, seeds layering, tubers, buds, grafts. Note the periods of growth and reproduction; study duration — annuals, biennials and perennials.

Make drawings of trees before leaves appear in spring.

> "I see yonder leafless trees against the sky,
> How they diffuse themselves into the air,
> And, ever subdividing, separate,
> Limbs into branches, branches into twigs,
> As if they loved the element, and hasted
> To dissipate their being into it." EMERSON.

Note effect of light on color of plants; difference in color of apples on the upper limbs receiving most sunlight and those growing on the lower limbs where there is too much shade; notice the blanching of celery and the shadded leaves of cabbage; place a plant in a dark room and notice how the color will change; how if there is a window it will grow toward the light. Why do trees grow taller in the thick forest than

in an open space or field? How does this effect the value of timber? How should we prune fruit trees? Why do we mulch orchards? Study different kinds of mulch; study effects of deep cultivation. Should we hill up corn or potatoes?

Send to Washington for the following Farmer's Bulletins:

218. The School Garden.
409. School Lessons on Corn.
423. Forest Nurseries for Schools.
428. Testing Farm Seeds in the Home and in the Rural School.
468. Forestry in Nature Study.

Animals:

Study the principles of incubation; care of chicks; care of young farm animals, such as colts, calves, pigs. Read Bulletins and study diseases of young stock; watch for the migratory movement of birds; date of appearance; prepare attractions for the birds near the home, compare damages done with benefits derived from the presence of sparrows, black birds, crows, owls, hawks, swallow, wren, bluebird and brown thrush.

Soils:—Find samples of as many kinds of soil as possible; sand sandy loam, clay, clay loam, silt, silt loam, soil and subsoil; plant seeds in each kind and note results; study effect of water on each kind of soil; note color of soils, where is there more of the organic matter or humus, in the soil or in the subsoil? How does a farmer increase the amount of humus in the soil? On what kind of land do the following crope grow best; apples, peaches, potatoes, alfalfa, timothy, wheat, corn, oats, onions and celery?

BOOKS.

Nature:

1. In American Fields and Forests. W. E. Kershner, (O. T. R. C. Columbus, Ohio.)
2. The Outlook to Nature. — Bailey. The Macmillan Co., New York.
3. Farm Friends and Farm Foes. — Reed. D. C. Heath & Co., Boston.
4. Butterfly and Moth Book. — Miller. Charles Scribner's Sons, New York.
5. The Fall of the Year. — Sharp. Houghton, Mifflin & Co., Chicago.
6. Birds and Bees. — John Burroughs. Houghton, Mifflin & Co., Chicago.
7. Walden. — Thoreau.

Scientific.

1. Practical Course in Botany. — Andrews. American Book Co., Chicago.

2. Elements of Agriculture. — Warren. Orange Judd Co., New York.

3. First Principles of Soil Fertility. — Vivian. Orange Judd Co., New York.

4. One Hundred Lessons in Agriculture.— Nolan. Row, Peterson & Co., Chicago.

5. Agriculture in the Public Schools by March Bros., Pub. Co., Lebanon.

Have the pupils read some of the following selections in connection with subjects mentioned:

Birds:

To a Waterfowl —— Bryant.
The Winged Worshippers — Charles Sprague.
The Bobolink.
To a Skylark — Shelly.
The Sandpiper — Celia Thaxter.
The Skylark — James Hogg.
The Wounded Curlew —— Celia Thaxter.
The Birds of Killingworth — Longfellow.
The Singing Lesson — Jean Ingelow.
Robin Redbreast — William Arlingham.
The Winter-king — Selected.

Flowers:

Daffodils — Wordsworth.
The Bluebell — Selected.
The Flower — Tennyson.

Trees:

A forest Hymn — Bryant.
The Planting of the Apple Tree — Longfellow.
Woodman Spare that Tree — Morris.
Woods in Winter — Longfellow.
How the Leaves Came Down — Susan Coolidge.

Nature:

The Brook — Tennyson.
Break, Break, Break — Tennyson.
The Wanderer — Eugene Field.
The Ocean — Byron.
The Chambered Nautilus — Holmes.
Thanatopsis — Bryant.
The Stranger on the Sill — Thomas Buchanan Read.
The Cloud — Shelley.
Darkness — Bryon.

The Seasons:

The Death of the Flowers — Bryant.
September — Helen Hunt Jackson.
October's Bright Blue Weather — Helen Hunt Jackson.
The First Snowfall — Lowell. The Corn Song — Whittier.
Freaks of the Frost — Hannah Gould.
Snow Bound — Whittier.
It Snows — Sarah Hale.
Midwinter — Trowbridge.
The Dying Year — Prentice.
The Snowstorm — James Thomson.
A Summer Longing — George Arnold.
Spring Again — Celia Thaxter.
March — Wordsworth.
April Day — Caroline Southey.
The Rainy Day — Longfellow.
Work — Eliza Cook.
Sowing and Reaping — Adelaide Proctor.
The Song of the Sower — Bryant.
The Summer Shower — Thomas Buchanan Read.

The Rural Life:

The Country Life — Stoddard.
The Old Oaken Bucket — Woodworth.
The Barefoot Boy — Whittier.
A True Sportsman — Foss.
That Calf — Alice Cary.
The Humblebee — Emerson.
Thoughts for the Discouraged Farmer — James Whitcomb Riley.
Evangeline — Longfellow.
The Deserted Village — Goldsmith.
Strawberries — Trowbridge.
The Fountin — Lowell.
Living on a Farm — Selected.
The Voice of the Grass — Sarah Roberts.
Good Night.

In Nature Study:

Read from Shakespeare.
Quen Mab's Carriage. Romeo and Juliet 1., 4.
A Colony of Bees. Henry V, 1., 2.
Read Eve's description of Eden, in Book IX Milton's Paradise Lost.

After looking into the great open book of nature, let the student open the books of literature in nature-study.

Hunt for beautiful quotations from the best authors that are applicable to the subject under consideration.

Make a collection of these interpretations of beauty by the world's great lovers of nature.

Make selections from Shakespeare, Wordsworth, Byron, Shelley, Emerson, Bryant, Longfellow, Tennyson, Whittier, Holmes, Riley, Ruskin, Thoreau, Burroughs and other writers of poetry and prose.

Third Division.

FALL TERM.

(Grades 7 and 8.)

See note to teacher at the beginning of this division in the Course of Study. A text-book on Elementary Agriculture should be used in this division. Give particular attention to the chief farm crop cultivated in your locality.

Study of Corn. — Have pupils bring to school a sample ear of each variety grown on their farm. Compare these and note difference. The ears brought by the different pupils should be labeled and numbered. In studying the different specimens of corn each ear brought to the class should be studied for the following characteristics:

A. Breed Characteristics.
   1. Shape and size of ear.
   2. Roughness of kernels.
   3. Color of ear.
      (a) Color of grain.
         1. Cap of grain.
         2. Side of grain.
      (b) Color and size of cob.
   4. Number of rows and size of kernels.
   5. Shape of grain as viewed in ear.

B. General Qualities:
   1. Weight of ear.
   2. Weight of grain.
   3. Weight of cob.
   4. Ratio of grain to cob.
   5. Size of kernels — shape, width, depth.
   6. Space between grains, between rows.
   7. Space between grains.
      (a) At tip.
      (b) At crown.
   8. Filling out of butts and tips of ears; maturity and seed condition.
      (a) Hardness of grain and cob.
      (b) Dryness of grain and cob.

(c) Weight of ear in proportion to size.
(d) Color of ear and grains.
    1. Due to immaturity.
    2. Due to moisture conditions.
(e) Color of germs.
(f) Size of germs.
(g) Freedom from mold and attack of insects or other injury.
    1. Uniformity of grains in:
        (a) Size.
        (b) Shape as viewed in ear.

Rules to observe in selecting good seed corn:

1. Ears should be of medium size.
2. Ears of a bright, healthy color, that are heavy for their size.
3. Ears with kernels of uniform size and shape.
4. Ears with rows running parallel to the length of the cob, with little space between the rows and well filled out at the butts and tips.
5. Ears having a uniform diameter; that is, not too pointed at the tip or too large at the butt.
6. Ears in which the germ of the kernel is large.
7. Ears that are produced under normal conditions.

Diseases of the corn plant. Insects that are injurious. The harvesting of corn. The selection of seed in the field. Methods of building the corn crib. Machinery — corn binders, corn shredders and huskers, corn cutters and corn shellers, etc. Plans for caring for seed corn in Fall and Winter. Experiments for showing shrinkage by keeping over Winter. Weigh a half bushel at harvest time. Weigh the same corn in April. Find loss. Formulate problem for class use showing loss in value when corn is sold in the Spring at Fall prices. Find the prices necessary to receive in Spring to justify loss of weight over Winter. For further information on farm problems see Hatch & Hazelwood's Elementary Agriculture, by Rowe, Peterson & Co., Chicago, 60c. Conduct a Corn Display and Contest. This can be done in connection with your Thanksgiving Day or other public exercises. Select recitations appropriate to the day. Have an exercise in corn judging where pupils are prepared. Compositions on "How I Cultivated My Corn," etc., "How I Grew My Potatoes," "How I Managed My Vegetable Garden," and similar subjects.

References: U. S. Department of Agriculture, Washington, D. C.; Farmers' Bulletins, No. 199, Corn Growing; No. 229, The Production of Good Seed Corn; No. 253, Germination of Seed Corn; No. 298, Food Value of Corn and Corn Products; No. 303, Corn Harvesting Machinery; No. 313, Harvesting and storing Corn.

Helps for Teachers.

(1) The A. B. C. of Corn Culture, by Prof. P. G. Holden, Ames, Iowa. This small pamphlet tells all about the culture of corn from the selecting of the seed to the harvesting of the crop the following year. It is all told in the language of the child.

(2) Nature Study on the Farm, American Book Co., Cincinnati, Short stories about things that take place on the farm.

(3) Farm Friends and Farm Foes, D. C. Heath & Co., New York. Farm Friends and Farm Foes, as indicated by the title, tells in simple language something about the things that are really the farmer's friend and points out the foes of the farmer and how to get rid of them.

(4) Examining and Grading Grains, Ginn & Co., Columbus. Examining and Grading Grains gives illustrations sohwing how all good grains should appear and sets forth rules for grading them.

(5) Agriculture in the Public Schools, published by March Bros., Lebanon. Agriculture in the Public Schools contains sixty practical experiments that pupils can perform with home made apparatus; rules for judging corn; how to conduct corn, vegetable and flower growing contests; questions to prepare the teacher for an examination in Agriculture with the bulletin suggested to answer many of the questions; and plans for the teaching of Agriculture.

Study of Wheat or Other Grain. — See Notes in Course of Study. Make a list of the grain crops grown in your neighborhood. Find the average yield per acre secured on the different grain crops. Account, if possible, for the cause that produced such a difference in yield in the same crop and on the same kind of soil. Was any fertilizer used? If so, what kind? What were the ingredients of same? Were the grain fields sown in clover or other grass? What became of the straw of the grain? Find out how many crops have been grown on different fields since they were in clover or other grass. What is meant by three year rotation? Four year rotation? Each pupil make a map of his home farm or one with which he is familiar. Indicate on this map the crop that was last grown in each field. Teach pupils to grade grain. What is meant by No. 1, 2, 3 and 4 in grading grains. Write to the Railroad and Warehouse Commission, Chicago, Ill. Ask them to send you (teacher) the rules for grading wheat, as fixed by the commission. Rules for the study of other grains can also be secured by writing this commission. Teach pupils plans of treating seed wheat or other grain to prevent smut. (See text-book.)

References: U. S. Department of Agriculture; Farmers' Bulletins, No. 132, Insect Enemies of Growing Wheat.

From Wooster Experiment Station, Wooster:

Wheat — Cultural and variety tests, Bul. 82, 118, 129, 165.

Oats—Cultural and variety tests, Bul. 67, 138 and Circular 88.

Diseases of Oats—Bul. 67, 97, 210.

Fruit Study. — See Notes in Course of Study.

1. What varieties are grown in your district? What varieties produce the best quality? Name those that ripen in the summer, in the Fall; which are the best keepers? Which are good "cooking" apples? "Eating" apples? Have pupils bring in a few samples of the Fall varieties. What insects injure the apples in your district? How can this be prevented? Secure "The Spray Calendar" from the Wooster Experiment Station, Wooster, Ohio. Should any one desire to know the "names" of certain apples, the same can be obtained by sending specimens to the Secretary of the State Board of Agriculture, Columbus, Ohio.

2. Where can young trees be secured? Find out all you can about some of the leading nurseries in Ohio. Write to the State Horticultural Society for information on fruit growing. The law of Ohio now requires that all orchards be sprayed at least once a year.

3. Learn the proper methods of planting the apple tree. Why trim the roots? Why trim the top?

4. Pruning is very important. Study your text-book on this subject. See also the State and National Bulletins on "Pruning." What time of the year do the farmers of your district prune their orchards?

5. See your text-book on methods of grafting and budding. The teacher can secure a set of grafting tools and can show the pupils how to proceed in this work.

6. Cultivation of the orchard. Are the orchards in your district well cared for? Are they sprayed regularly every year? Are they clean? How about the fence rows? Have they been kept free from orchard trash? Is the land cultivated every year or is it in grass? Is there any mulch about the tree? Could the yield be increased? How? Sometimes old orchards have been renovated, resulting in good profits. How can this be done? Write to Wooster Experiment Station and ask them to send you some literature on the "Cultivation of the Orchard." A few trees well cared for will give better results than a large number that are neglected. In planting an orchard for the home, select such varieties that have proven satisfactory in your locality and those that ripen their fruit at different times of the year.

7. Disease of the orchard.
   (a) Fungous — Blight, mildew and the scab.
   (b) Insect pests — The San Jose scale, codling moth, apple tree tent caterpillar, etc.

Learn to identify these pests. What is an insecticide? Name two. How are they prepared? What is a fungicide? Name two. How are they prepared? For "sucking" insects a kerosene emulsion may be used.

References: U. S. Department of Agriculture, Farmers' Bulletins:
No. 87, Orchards, Cover crops, and Cultivation.
No. 113, The Apple and How to Grow It.
No. 154, The Home Fruit Garden.
No. 181, Pruning.
No. 198, Strawberries.
No. 283, Spraying for Apple Diseases.
No. 293, Use of Fruit as Food.
From Wooster Experiment Station, Wooster:
Orchard Culture, Bul. 171.
Dependable Fruits, Cir. 55.
Renewal of Old Orchards, Bul. 180.
The Codling Moth, Bul. 160.
Protection of Fruit Trees from Rodents, Bul. 208.

Weeds.—See Notes in Course.

1. The pupil should be taught to recognize the weeds and their seed that are common in your school district. Field trips may be taken or plants may be brought into the school room for identification. What is a weed? How do weeds travel? Do the weeds of the field differ from those of the garden? Name kinds common in each. Give frequent reviews in weed identification. You can do this by placing a slip of paper containing a number on each specimen and then have the pupils write the name on the paper. Weeds can be exchanged and grading done. Teach only the common name in the elementary school. High school pupils that have had Latin might also be given the Botanical name.

2. General characteristics of weeds:
   (a) A very extensive stem growth either erect or horizontal.
   (b) Special adaptation to soil conditions.
   (c) Usually perfect means of seed dispersal.
   (d) Other means of reproduction besides seeds.
   (e) Special adaptation to moisture conditions.

3. Weed control:
   (a) Plow ground early as possible after planting to get the weeds checked.
   (b) Keep the seed beds clean all summer.
   (c) Keep the fence, rows and pasture fields clean from weeds that may go to seed.
   (d) Practice crop rotation.
   (e) Plant a smothering crop.

4. Weed extermination:
   (a) Apply strong salt water or weak carbolic acid on plants.
   (b) Spraying such weeds as the dandelions, mustard and plantain with iron sulphate.

(c) Pull them out of the ground so as not to leave any roots.
(d) Plow as late as possible and follow by frequent harrowing when convenient.

5. Classification:
(a) Annuals.
(b) Biennials.
(c) Perennials.

References: U. S. Department of Agriculture, Farmer's Bulletins
No. 28, Weeds: and How to Kill Them.
No. 86, Thirty Poisonous Plants.
No. 188, Weeds Used in Medicine.
From the Wooster Experiment Station, Wooster:
Weed Manual, Bulletin 175.
Spraying for Weeds, Circular 102.

Insects.—See notes in bulletin.

Learn to recognize as many useful and injurious insects, as may be found conveniently in your district. Distinguish between the moth and the butterfly. See "Coulter-Patterson's Practical Nature Study" or Hodge's "Nature-Study and Life," for supplementary work in nature on insect life. Learn the life stages of the insect. Observe specimens illustrating the different stages in a few common insects. Learn the parts of the insect. Flies and mosquitoes can be studied in the Physiology class. Teach the children to see the relation existing between the insect world and the bird world; between the insect world and the plant world. Make a collection of useful and injurious insects to the farmer. Distinguish between the "biting" and the "sucking" insects; insect destroyers—birds, toads, etc. What birds live largely on insects? Why should these birds all be protected by law? Learn how to prepare a good insecticide.

References: U. S. Department of Agriculture, Bureau of Entomology:—Circular No. 16, The Larger Corn Stalk, borer; Circular No. 67, The Clover Root, borer; Circular No. 73, The Plum Curculio; Circular No. 87, The Colorado Beetle; Circular No. 92, Mites and Lice on Poultry; Circular No. 98, The Apple-tree Tent Caterpillar; Separate No. 355 (Year Book of 1904), Insects' Injuries to Forest Products; Separate No. 381, (1905), Insect Enemies of Forest Production.

U. S. Department of Agriculture, Farmer's Bulletins:
No. 99, Three Insect Enemies of Shade Trees.
No. 196, Usefulness of the American Toad.
No. 275, The Gypsy Moth.
From Wooster Experiment Station:
Insects Affecting Ohio Shade Trees, Bul. 194.
Spraying Machinery, Bul. 216.

For San Jose Scale, Bul. 169, Circular 69.
For Grape Rot, Bul. 130.
Chinch Bug, Bul. 77 and 106.
Cicada, Periodical, Bul. 87.
Hessian Fly, Bul. 107, 119, 136 and 177.

Forage Crops—See Notes in Course. What grasses are best adapted for permanent pasture? Why? For hay? Why? What are the true grasses? Where do they obtain their nitrogen? Are they beneficial to the soil? Why? What are the clovers? Where do they obtain their nitrogen? How do they improve the soil? Why should the seed of the clovers be planted with the seed of the true grasses for hay crops? Make a study of the "Meadow." What fertilizers are used to aid the growth of grass crops in your locality? Make a study of alfalfa and its culture. Find out the difference in the production and the methods of cultivating the different clovers. Also observe the following outline: When cut? How cured? Number of times cut? Purpose of second cutting. Why is the second growth often plowed under? Number of pounds of seed sowed to the acre? How is it threshed for seed? Yield per acre? Price per bushel? Number of pounds per bushel? Total average income per acre? Average net income per acre?

Classification of clovers:

(a) The true clovers.
(b) The medics.
(c) The melilots of sweet clovers.

The true clovers include: the red (mammoth and medium), the crimson, the alsike and the white.

The medics include the alfalfa and burr clover.

The mililots are white and yellow.

Compare food value of these clovers. Get each kind and teach pupils to recognize them. Note the root system—length, branching and nodules. Make a study of rape, millet and sorghum and other forage crops.

References: U. S. Department of Agriculture, Farmers' Bulletins:
No. 260, Seed of Red Clover.
No. 278, Leguminous Crops for Green Manuring.
No. 315, Progress in Legume Inoculation.
No. 318, Cowpeas.
No. 339, Alfalfa.

From Wooster Experiment Station, Wooster:
Culture of Alfalfa, Bul. 181, and Circular 91 and 80.
Forage Crops, Bul. 70.
Soy Beans, Cir. 78.

Millet, Circular 81.

The Farm Grasses of Ohio, Bul. 225.

See A. A. Upham's An Introduction to Agriculture, by D. Appleton & Co.; also Burkett, Stevens and Hill, by Ginn & Co.

Dairying.—See Notes in Course.

References: U. S. Department of Agriculture, Farmers' Bulletins:
No. 22, Feeding Farm Animals.
No. 55, The Dairy Herd.
No. 106, Breeds of Dairy Cattle.
No. 166, Cheese Making on the Farm.
No. 141, Butter Making on the Farm.

From Wooster Experiment Station, Wooster:
Feeding for Beef, Bul. 60.
Tuberculosis of Cattle, Bul. 108.
Silage versus Grain for Dairy Cows, Bul. 155.
Silage for Fattening Cattle, Bul. 193.
Value of Individual Records for Dairy Cows, Cir. 67.

Teach children the meaning of the term "Balanced Ration" and how to feed to produce a "balanced ration." See Goff & Mayne's First Principles of Agriculture, by American Book Company, Cincinnati.

Make a study of the silo. Best crops for silage. Why is corn the main silage crop? What kinds of corn are best adapted for silage? Why? At what stage of development should corn be cut for silage? Could good silage be made out of fully ripened corn? Why not? Does the frost effect the corn intended for silage? In filling the silo, why is it necessary to thoroughly pack the corn? Why should the corn next to the outside of the silo be packed more than that in the center? Have pupils bring corn to school that is in the proper condition for being placed in the silo. The parents should be consulted by the pupil in selecting corn in the proper condition for the silo.

See Farmers' Bulletins published at Washington:

No. 32, Silos and Silage.
No. 292, Cost of Filling Silos.

Milk.—Every pupil whose parents are interested in dairying should be taught the use of the Babcock tester. It is one of the most important factors to consider in the dairy business. Schools should be supplied with a Babcock Milk Tester. Teachers everywhere are surprised at the interest that can be aroused in the community by having the pupils test samples of milk and cream.

Pupils should also be taught:

(1) The care of the milk cans and pails.
(2) What feeding stuffs may effect the flavor of the milk.

(3) The reason for prompt removal of the milk from the stable.
(4) The necessity of the milker wearing clean clothing.
(5) The necessity of having cows kept clean and comfortable.
(6) The necessity of giving the cows good treatment—being kind and gentle with them at all times.
(7) The necessity of feeding balanced ration.

References: U. S. Department of Agriculture, Farmers' Bulletins:
No. 42, Facts about Milk.
No. 63, Care of Milk on the Farm.
No. 348, Bacteria in Milk.

Farm Papers: Do not fail to take a good farm paper to your school for the use of the pupils. Get them in the habit of reading these papers. See list recommended in the course of study. Secure samples of these journals and see that the pupils have access to at least one of these papers.

Social Life of the Rural Community.

The teacher should become a leader in educational matters in the community. Various plans may be carried out to bring this about. The following are suggested:

1. Parents' Meeting where exercises are given by the children. This gives the teacher and patrons an opportunity to become better acquainted.

2. Agricultural Clubs, where pupils are given an opportunity to express their views on different phases of Agricultural work and at which time contests may be held.

3. Rural Lecture Courses, where all departments of education may be presented.

4. Farmers' Institute. Teachers should interest themselves in the promotion of Farmers' Institutes.

5. Township and Village school displays sohuld be encouraged, consisting of all work done in school.

6. Traveling Libraries should be secured from the state department. Any one interested in getting the use of good books free should write the State Librarian, State House, Columbus, Ohio.

7. Encourage County Fair Boards to offer prizes on Agricultural products cultivated by your pupils.

8. Give your encouragement to all of the Farmers' Organizations that are promoting Agricultural Education.

WINTER TERM.

(Grades Seventh and Eighth.)

See notes to teacher at the beginning of this division in the Course of Study. A text-book on Elementary Agriculture (See list recom-

mended on page 11 of the Tentative Course of Study) should be used in this division. Give particular attention during the winter months to the study of "Housing and Protecting Farm Animals." *Study of Farm Animals*—Secure photographs of pictures of the common farm animals raised in Ohio. Pictures can be taken from Agricultural bulletins and agricultural newspapers. Teachers should also have the pupils visit a stock farm where pure bred animals are kept. The owners or keepers of these animals will be glad to explain to the children about the plans of caring for the animals, leading characteristics, etc.

The following outline is suggested for use in connection with the study of Farm Animals.

Farm Animals.

1. Horses.
   - (a) Origin and distribution.
   - (b) Types and breeds—their characteristics.
     - (1) Draft—English Shire, Clydesdale, Percheron, French Draft, Belgian, etc.
     - (2) Coach—French Coach, German Coach, Cleveland Bay, Hackney, etc.
     - (3) Roadsters and Light Harness—American Trotter, The Thoroughbred, The American Saddle Horse, etc.
     - (4) Ponies—Shetland, Indian ponies, Mustangs, Welsh Polo, etc.
2. Cattle.
   - (a) Origin and distribution.
   - (b) Types and breeds—their characteristics.
     - (1) Beef—Shorthorn, Hereford, Aberdeen—Angus, Galloway, Sussex.
     - (2) Dairy—Jersey, Guernsey, Ayrshire, Holstein—Frisian, Brown Swiss.
3. Swine.
   - (a) Origin and distribution.
   - (b) Types and breeds—their characteristics.
     - (1) Large Breeds—Chester White, Improved Yorkshire, Tamworth.
     - (2) Medium Breeds—Berkshire, Poland-china, Duroc-Jersey.
     - (3) Small Breeds—Small Yorkshire, Essex, Victoria, etc.
4. Sheep.
   - (a) Origin and distribution.
   - (b) Types and breeds—their characteristics.
     - (1) Fine—wooled—American Merino, Delaine Merino, French Merino and Cheviot.

(2) Medium—wooled—Southdown, Shropshire, Dorset, Hampshire, Oxford, etc.
(3) Long-wooled-Cotswold, Leicester and Lincoln.

References: Bulletins from the Department of Agriculture, Columbus. Bulletins from the Agricultural College, Columbus. U. S. Department of Agriculture, Washington D. C., Farmers' Bulletin.

No. 96, Raising Sheep for Mutton.
No. 159, Scab in Sheep.
No. 170, Principles of Horse Feeding.
No. 179, Horseshoeing.
No. 205, Pig Management.
See also Bulletins mentioned under Dairying in the "Fall Work".
See also the book—Types and Breeds of Farm Animals by Charles S. Plum.
Use supplementary text books and helps for teachers recommended under "Fall Work."

Bulletins from Wooster Experiment Station, Wooster, Ohio:

No. 195, Feeding work horses.
No. 91, 117, Lung and stomach worms of sheep.
179, 187, Fattening range lambs.
No. 73, (Circular), Tankage for hogs in cattle feed lots.
No. 209, Rations for fattening swine.
No. 213, Specific effects of rations on the development of swine.

Farm Machinery—Kinds, uses, value, care of. History to show improvement. Catalogues from concern where farm machines are manufactured can be secured for school use.

Soil Study—Test soil for acid and alkali. What elements are usually lacking in soils? How can they be secured? Secure samples of commercial fertilizers in small bottles. What are the ingredients of each? Samples of phosphate rock and other fertilizing materials can be secured for school use by addressing fertilizer factories. Make a collection of soils in small bottles. Test the soils for their power to retain water and for capillarity. Teaches uses of tile drains. Soil improvement. Influence of Crop Rotation on Soil Improvement. Saving soil moisture. Soil water. Soil mulch. Plant food in soil. Renewing old soil. Value of the clovers in soil improvement. Mixing of home fertilizers. Study methods to improve Ohio's soil. Influence of tillage on soil. Soil must be improved to support increased population. Perform experiments in connection with the study of soil.

References—U. S. Farmers' Bulletins:
No. 77, Liming of Soils.
No. 83, Tobacco Soils.
No. 88, Alkali Soils.

No. 257, Soil Fertility.
No. 266, Management of Soils.
No. 406, Soil Conservation.
From Wooster Experiment Station, Wooster.
No. 159, 141, Lime as a fertilizer.
No. 182, 183, 184, Maintenance of fertility.
No. 59, (Circular), Soil Treatment of Tobacco Beds.
No. 79, (Circular), Requirement for Ohio Soils.

Literature for the Teacher.

Walden, by Henry D. Thoreau.
Birds and Bees, by John Burroughs.
The Fall of the Year, by Dallas Lore Sharp.
The Bee People, by Margaret W. Morley.

In the study of birds, let the pupils read: The Wounded Curlew; To a Waterfowl; The Winged Worshipers; The Bobolink; To a Skylark; The Sandpiper; The Singing Lesson.

In the study of flowers, read: Daffodils, by Wordsworth. To Daffodils, by Robert Herrick.

Trees—A Forest Hymn—Bryant.

When you are studying kindness to animals, read: A True Sportsman, by Sam Walter Foss. That Calf—Alive Cary.

The Builders—Longfellow. Pictures in a Poem—Trowbridge.

In the study of nature, read: The Brook, by Tennyson. Coal, by Kingsley; The Wanderer, by Eugene Field; The Chambered Nautilus, by Dr. Holmes; The Ocean, by Byron; Thanatopsis, by Bryant; The Stranger on the Sill, by Thomas Buchanan Read.

Winter Study—Freaks of the Frost, by Hannah Gould.

The First Snowfall—Lowell. Midwinter—Trowbridge.

Angling—George Howland.

Among the best poems on rural life are such as, Longfellow's Evangeline, and Goldsmith's Deserted Village. The Waggoner of the Alleghanies, by Thomas Buchanan Read. Snow Bound, by Whittier.

Prose—Irving's Sketch-book.

SPRING WORK.

Third Division.

(Grades 7 and 8.)

Poultry Raising:—Breeds of chickens of the neighborhood; characteristics of each; feeding, housing and general care. Incubators and brooders; expenses and profits in poultry.

1. Points to be observed in caring for eggs for hatching:—
    1. Gather every day in warm weather and every two or three hours in cold weather.
    2. Keep in temperature about 60° F.
    3. Turn eggs daily.
    4. Set eggs less than ten days old.
    5. Set regular shaped eggs.
    6. Set eggs from the best laying hens.
    7. Never set eggs from diseased chickens.

2. Points to be observed in caring for the hen while setting:—
    1. Place her where she will not be disturbed by other hens.
    2. Keep water and shelled corn before her.
    3. Keep box of dust or weak ashes before her.
    4. Dust the hen with insect powder when you set her and every week thereafter.
    5. Take her off the nest as soon as all fertile eggs are hatched.

3. Points to be observed in the care and feeding of young chicks:—
    (a) Care
        1. Place coops on well drained ground.
        2. Keep coops clean and airy.
        3. Move coops frequently.
        4. Change location every year.
        5. Dust with insect powder, etc., to prevent lice.
        6. Keep out rats, etc.
        7. Keep in small quarters while very young.
    (b) Feeding
        1. First meal when about 48 hours old.
        Bread soaked in milk and squeezed or boiled egg, then chick feed, fine grit.
        2. Later coarse corn meal, cracked corn and cracked wheat.
        3. After third week mix a little beef scraps with feed.
        4. Keep fresh water before them. Use drinking fountain if necessary to keep water clean.
        5. Feed three times a day while young.
        6. Small chicks should be fed in separate pens from old hens and large chicks.
        7. Skim milk and cheese are valuable food.

4. Care of cockerels:—
    1. Feed regularly and all that will be cleaned up well. Include beef scrap in rations.
    2. Keep in comparatively small quarters.
    3. Market when the price justifies and cockerels are in good condition.

5. Care of pullets:—
   1. Give free range.
   2. Worms, beef scrap or green bone.
   3. Fresh water and good grain.
   4. Keep in clean, well ventilated coops or houses.
   5. Avoid having them roost in a draft.
   6. Keep out lice and mites.
   7. If properly cared for they will lay by early winter.
   8. Market surplus stock.
6. Winter egg production:—
   1. Breed from winter layers.
   2. Use male from good layers.
   3. House: well ventilated, clean and dry.
   4. Exercise: Feed whole grain in litter.
   5. Green food: cabbage, beets, turnip, clover, alfalfa.
   6. Give fresh warm water.
   7. Avoid causing them to eat snow.
   8. Feed warm mash in mornings.
   9. Mash can be fed dry or moistened with hot water or warm skim milk.
   10. Mash may include corn meal, bran, oat meal, and about 5% ground alfalfa and beef scrap.
   11. Keep fine grit before them.

References: Poultry magazines and journals, Incubator catalogues and leading farm papers.

U. S. Department of Agriculture—Bulletins:

No. 41—Fowls, Care and Feeding.
No. 51—Standard Variety of Chickens.
No. 64—Ducks and Geese.
No. 236—Incubation and Incubators.
No. 141—Poultry Raising on the Farm.
No. 182—Poultry as Food.
No. 200—Turkeys, Varieties and Management.
No. 287—Poultry Management
No. 357—Methods of Poultry Management at the Maine Agricultural Experiment Station.

From Wooster Experiment Station, Wooster. Ask to be placed on their mailing list to receive all bulletins.

From Maine Agricultural Experiment Station, Orono, Maine:

No. 100—Poultry Management.
No. 168—The Fertility and Hatching of Eggs.

For disease of poultry—get Bulletin No. 138—The Poultry Industry in Maryland, from Maryland Agricultural Experiment Station, College Park, Md.

The Biggle Poultry Book from Farm Journal, Philadelphia, Pa.

Fruit Study—Where fruit raising is practiced extensively, study propagation by grafting, by budding. Why necessary. History of some one fruit from seed to maturity. Pruning, planting and spraying of fruit trees. Secure bulletins (See list mentioned under Fruit Study in the Autumn Bulletin). Also write State Board of Agriculture, Columbus and Wooster Experiment Station, Wooster, for their Spray Calendars.

Corn Study—Germination of seed, make corn testers; compare tests for vitality. Grading corn. History of Corn. Varieties adapted to your locality. Planting and Cultivating Methods. Experiment in depth of planting

Determining Germinating Strength.

NOTE TO TEACHERS: Points to be considered in preparing geminating boxes:

1. Direct pupils to bring to school shallow boxes filled with sand.
2. Have them divide the sand surface into small squares.
3. Number each one of the small squares.
4. Number ears of corn or other kinds of seed to be tested to correspond with the number on each small square.
5. Remove six grains from different parts of ear, number (1) and place in square number (1).
6. Continue this process until all squares are filled.
7. When all squares are filled moisten the sand and keep in a warm place until the corn (or other grain that is being tested) comes up.
8. In the country schools the boxes cannot be kept at school, if the house is not well heated over night. Pupils in these schools should be directed to take the boxes home and keep them where they will not be destroyed until the test is finished. The sand in the boxes should not be allowed to dry out until the plants have reached an inch or two in height. When the plants (if corn) have reached this height the boxes can be returned to school. The productiveness of each ear of corn may then easily be determined by noting the strength and vigor of the plant produced from each kernel planted. Reject all ears that did not produce strong plants that are uniform in size and all six grains productive. Some seasons it is impossible to get perfect germination in corn but we should get ears as near perfect as possible. See the form following for recording germinating tests.

Form for Recording Germinating Tests.

The following is a convenient form for keeping a record of seed testing that is carried on by pupils:—

Name of Seed: Corn.
Number of Seed in Tester: 200.

Date Started.	Date Sprouted.	No. of Grains Sprouted.	No of Grains not Sprouted.	Per Cent Sprouted.	Per Cent not Sprouted.
Feb. 4.....	Feb. 10.....	80	120	40	60
Feb. 15.....	Feb. 22.....	100	100	50	50
Feb. 25.....	Mar. 2.....	120	80	60	40
Mar. 3.....	Mar. 10.....	190	10	95	5
Mar. 4.....	Mar. 11.....	196	4	98	2

Source of Seed: Secured from a successful corn grower near home.

Remarks: Only the last show per cents good enough to plant. All sprouts in last two indicate a strong germ.

Name of pupil: Edwin Harkrader.

School: Hillsdale.

Prepare to have a corn, vegetable and flower growing contest during the summer and exhibit the products at the County Fair, or at school early in the fall term.

For information on "Corn Culture", "Nature Study on the Farm", "Farm Friends and Farm Foes", "Grading of Grains", and Plans for conducting Corn, Vegetable and Flower Growing Contests and exhibits, see under *Helps For Teachers,* page 14, of the Autumn Bulletin.

Always test all seeds for vitality before planting. Treat potatoes for scab with formalin. See text book for method. Examine clover and grass seed with hand lens to find weed seed and other impurities. See other suggestions in Autumn Bulletin.

*Corn Record.**

The following Corn Record is Suggested for Pupils Doing Contest Work:

Preparation of Seed Bed.....
.....
.....
Kind of Soil.....Area of Corn Plot.....
Variety of Seed Corn.....
From what place was the Seed Corn secured?.....
Was it tested to determine whether or not it would sprout?.....
Date of Planting?.....
What Depth? .....
Drilled or Checked?.....
When Corn appeared.....
Dates of cultivation and how cultivated?.....
.....
.....
.....

*This record can be altered so it can be used for vegetable and other contests.

Purposes of Cultivation?.....
.....
To what degree was the corn damaged by all causes?.....
Date of harvesting the ears?.....
Were the ten ears exhibited selected when the corn was standing or after husking?
.....
.....
Did you find the variety of corn you used suited to your soil and climate?
.....
.....
Why? .....
Witness, outside of family, that can certify, if necessary, that the corn was cultivated and harvested by the person keeping this record.....
..... Address .....

References: See list mentioned in Autumn Bulletin. Secure the following circulars from Wooster Experiment Station, Wooster.

No. 53—Experiments with Corn.
No. 66—Corn Breeding and Registration.
No. 71—The Selection of good seed corn.
Also No. 428—Testing Seeds—From Washington, D. C.

Bird Study—

1. Birds should be studied all the year around.

2. Begin with the ones the most common and learn to recognize a few each month. Winter is a good time to begin as there are not so many different kinds. Note changes in some species from season to season. Note song, manner of flight, nest, habits and food.

3. Learn the purpose of the Audubon Society.

4. Study the Ohio law for the protection of birds. What birds are protected by law? What other birds should be added to this list? Why should these be added? Name the native birds that are beneficial to farm crops. Injurious to farm crops.

5. Look up your Arbor Day Bulletins from this office for information on birds.

6. Discuss methods of encouraging birds to stay with us. See Hodge's Nature Study and Life, pp. 327-345.

7. Who are bird enemies? See Burrough's "Birds and Bees."

8. For suggestive exercises on birds see Coulter-Patterson's Nature Study, pp. 112, 122; also 301-313.

9. Study the economical value of birds and the migration of birds.

10. Old nest can be taken to school for study but discourage making egg collections as it leads to the destruction of birds.

Suggestion to teacher: If you desire your class to make a special study of the economical value of birds secure,—"Birds in Their Relation to Man" by Weed and Dearborn—published by Lippincott. Other books of interest on the subject of birds are as follows:—

1. Birds of Village and Field, Florence A. Merriam, Houghton, Mifflin & Co., Boston.

2. The First Book of Birds, Olive Thorne Miller, Houghton, Mifflin & Co., Boston.

3. Birds through the Year, Gilmore, American Book Co., Cincinnati.

4. Our Birds and Their Nestlings, Margaret C. Walker, American Book Co., Cincinnati.

References: U. S. Farmers Bulletin.

No. 54—Some Common Birds.

No. 197—Importation of Game Birds and Eggs for Propagation.

No. 383—How to destroy the English Sparrow.

No. 390—Pheasant Raising in the United States.

Note to teacher:—If pupils are interested in Quail have them write to Dr. H. C. Minnich, Oxford, Ohio, for information on raising quail. Dr. Minnich's son has been very successful in raising quail and will furnish information to those that may be interested in the subject.

Home Garden Studies—Those persons having had experience with school garden work not only in Ohio but also in other states agree that the home garden is better than the school garden to meet the need of rural children. In the larger villages and in the city, school gardens are without a doubt worth while, but, aside from the experimental work, they are in most cases neither practical nor profitable for the rural boy or girl. There is no question about the value of the Home Garden and the School Garden; the question is regarding its organization and management. The success of either plan will depend largely upon the enthusiasm of the teacher who must take the lead in all garden work. The teacher should plan the work carefully, first getting as much information on the subject as possible from all sources. Garden work successfully done is one of the very best possible means of interesting children in all forms of Agriculture. If it is not carefully planned and cared for after it is started it is likely to be a failure. Perhaps ninety per cent. of the failures in garden work result from the teacher undertaking the work before he has thoroughly investigated the subject and received some plans from other school teachers that have been successful. Then it is generally the case that most teachers ask the children to undertake too much in the beginning. Small gardens in the spring become large gardens when the sun gets hot in summer. Have each child who enters into the work understand that he is not to give up the work until it is completed. It is generally advisable to suggest to the children that they not undertake to plant more than two or three varieties of plants. The teacher undertaking garden work should have a record book and keep in it the names of the children planting gardens adn the kinds of seed grown by each one engaging in the work. These records should be left at the school, as a new teacher may be employed to take charge in the

fall and he must have these records. Children should be given credit for all their summer activities in the way of garden work or field work. The teacher should visit these gardens as often as possible and encourage the children in their work. Very simple records of the work done should be made by each pupil who has a garden.

Be sure to have an exhibit of some of the products cultivated by the children either at the County Fair or at the school house at the opening of school. You can have a "School Fair" of your own if it is not possible for all the children to take a part of their products to the County Fair. Have some exercises in connection with your "School Fair." Invite the parents and your State Supervisor of Agriculture to attend the exhibit. Secure some competent person to act as judge of the exhibit. Simple prizes may be offered for the best exhibit of each kind. It is very often advisable to secure the co-operation, if possible, of the parent in this garden and field work. Speak to the parents about the value of this work to the child and suggest that a piece of land be given to the child on which he may raise whatever he desires, and that he be allowed the profits obtained from the crops. The child should keep an account of the income and expenses. Teach him to see the businss side so that he may better understand the question of farm economics. If the crop is used by the parent, the child should be compensated for it.

References—U. S. Department of Agriculture. Farmers' Bulletins.

No. 154—The Home Fruit Garden.
No. 218—The School Garden.
No. 255—The Home and Vegetable Garden.
No. 256—Preparation of Vegetables for the table.
No. 385—Boys' and Girls' Agricultural Clubs.
No. 408—School Exercises in Plant Production.
No. 409—School Lessons on Corn.
No. 468—Farmers' Bulletin—Forestry in Nature Study.

TEXT-BOOKS IN AGRICULTURAL EDUCATION SUITABLE FOR THE 7TH AND 8TH GRADES OF THE ELEMENTARY SCHOOLS.

Name of Text-book.	*Name of Author.*	*Publishers.*
Beginnings in Agriculture....	Mann	MacMillan.
Agriculture for Young Folks.	A. D. & E. W. Wilson.	Webb & Co., Minneapolis.
First Principles of Agriculture	Goff & Mayne.....	Amer. Book Co., Cincinnati.
Agriculture for Beginners....	Burkett, Stevens & Hill.	Ginn & Co., Columbus.
Agriculture for Common Schools	Fisher & Cotton.....	Chas. Scribner's Sons, N. Y.

An Introduction to Agriculture	A. A. Upham	D. Appleton & Co., Columbus.
One Hundred Lessons in Elementary Agriculture	A. W. Nolan	Rowe, Peterson & Co., Chicago.
Agriculture in the Public Schools	Lester S. Ivins	March Bros. Pub. Co., Lebanon, O.

PAPERS AND MAGAZINES THAT AID IN THE TEACHING AND STUDY OF AGRICULTURE.

American Agriculturist	Orange Judd Co., New York.
Ohio Farmer	Lawrence Pub. Co., Cleveland.
National Stockman and Farmer	Pittsburg.
Farm and Fireside	Springfield, Ohio.
Farm Journal	Philadelphia.
Reliable Poultry Journal	Quincy, Ill.
Otwell's Farmer Boy (especially for boys and girls studying agriculture in school)	Carlinville, Ill.

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